Failure of Cleanup Oversight at Hunters Point Naval Shipyard

Presented to
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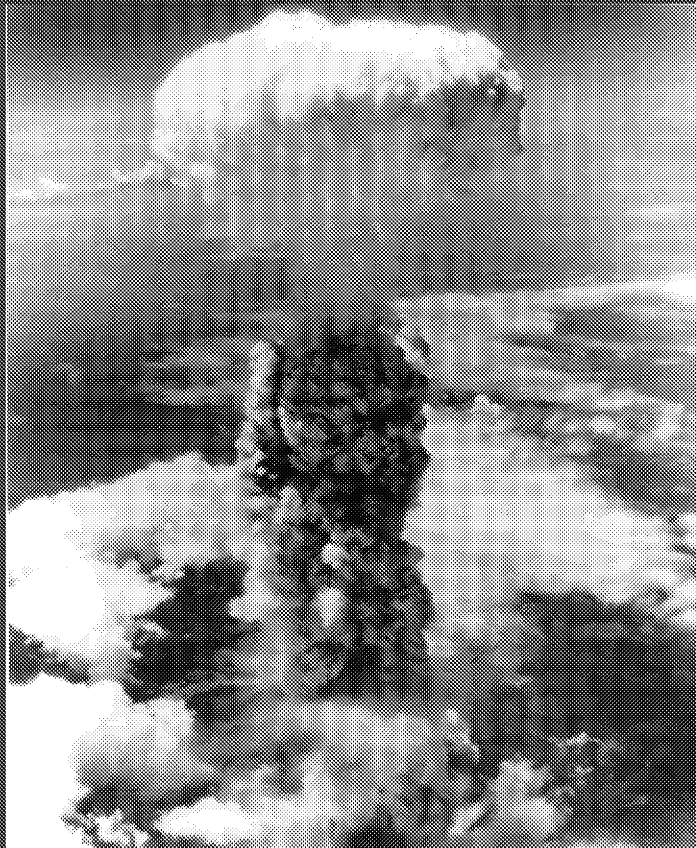
76 YEARS: Hunters Point & the Dawn of Nuclear Era

On July 16, 1945, the USS Indianapolis departed Hunters Point Naval Shipyard carrying components of a bomb code-named “Little Boy,” including half of the highly enriched uranium then in existence in the world. It was headed to Tinian Island in the Pacific. On August 6, the Enola Gay left Tinian and dropped the assembled atomic bomb on Hiroshima.



Hiroshima
August 6, 1945

Aerial view of Shot Baker, OPERATION CROSSROADS, July 25, 1946, ships in foreground; US Army Photographic Signal Corps

One year later: the OPERATION CROSSROADS atomic tests in the Bikini Atoll

The tests went awry, & badly contaminated hundreds of ships

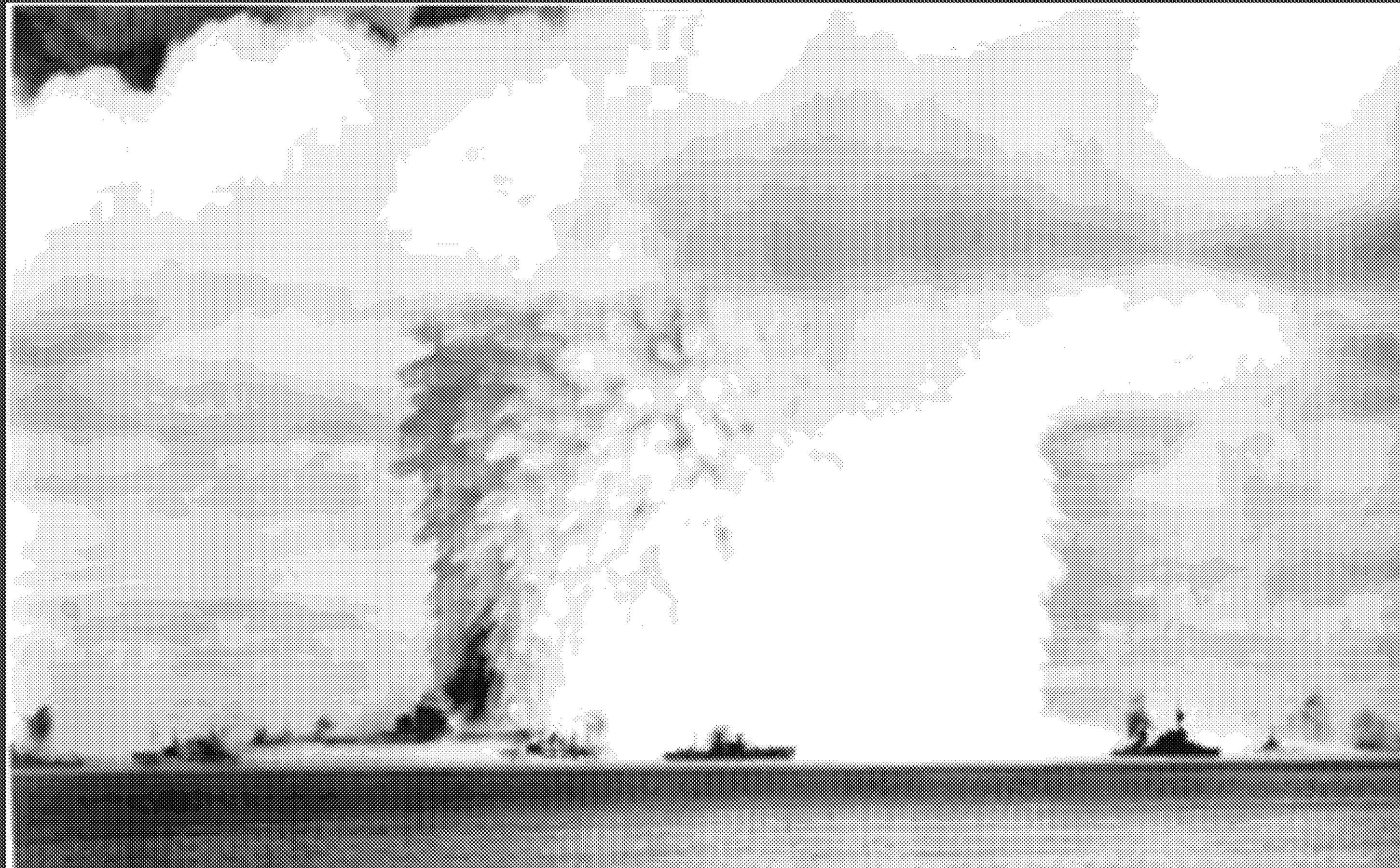
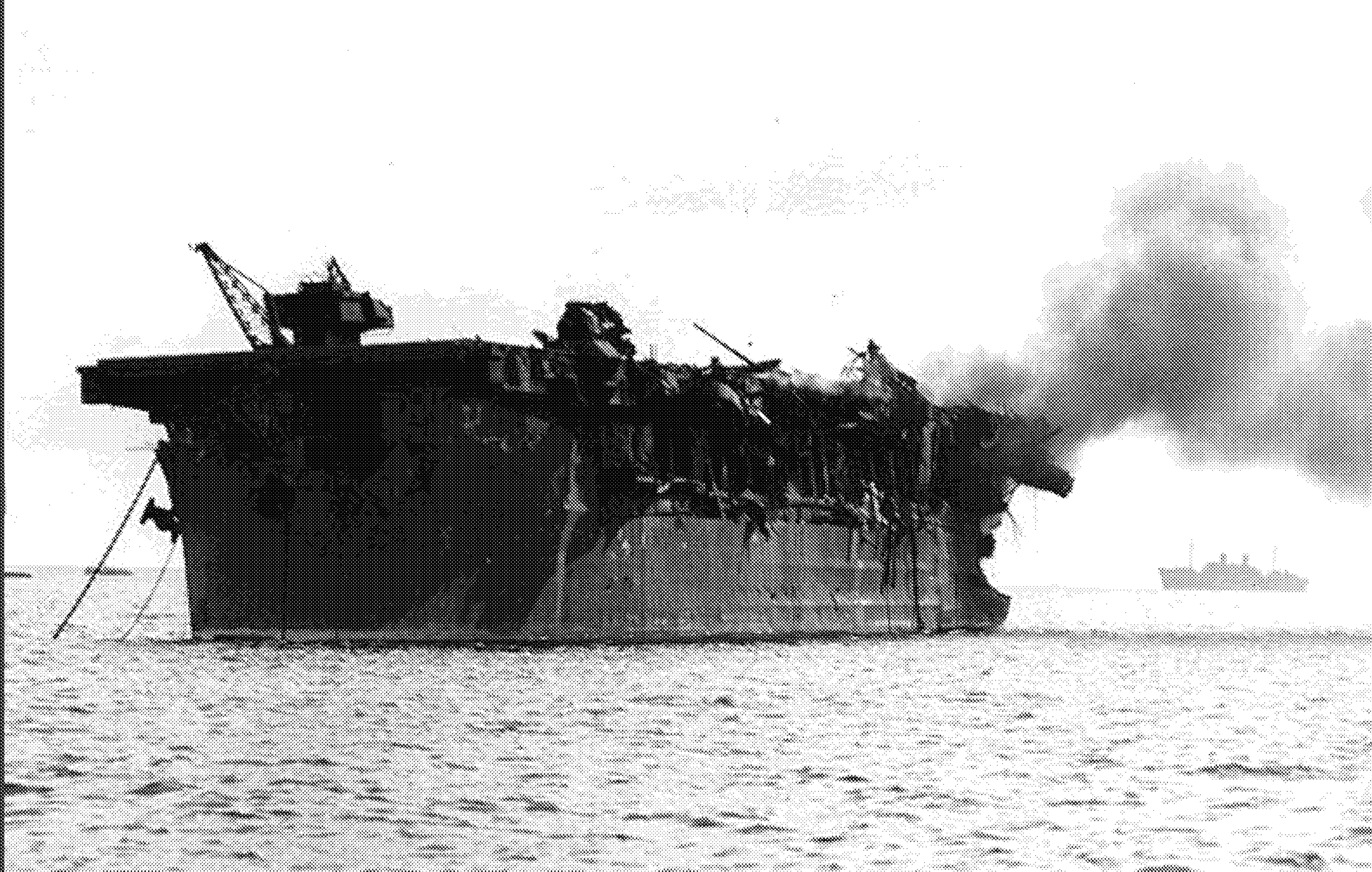
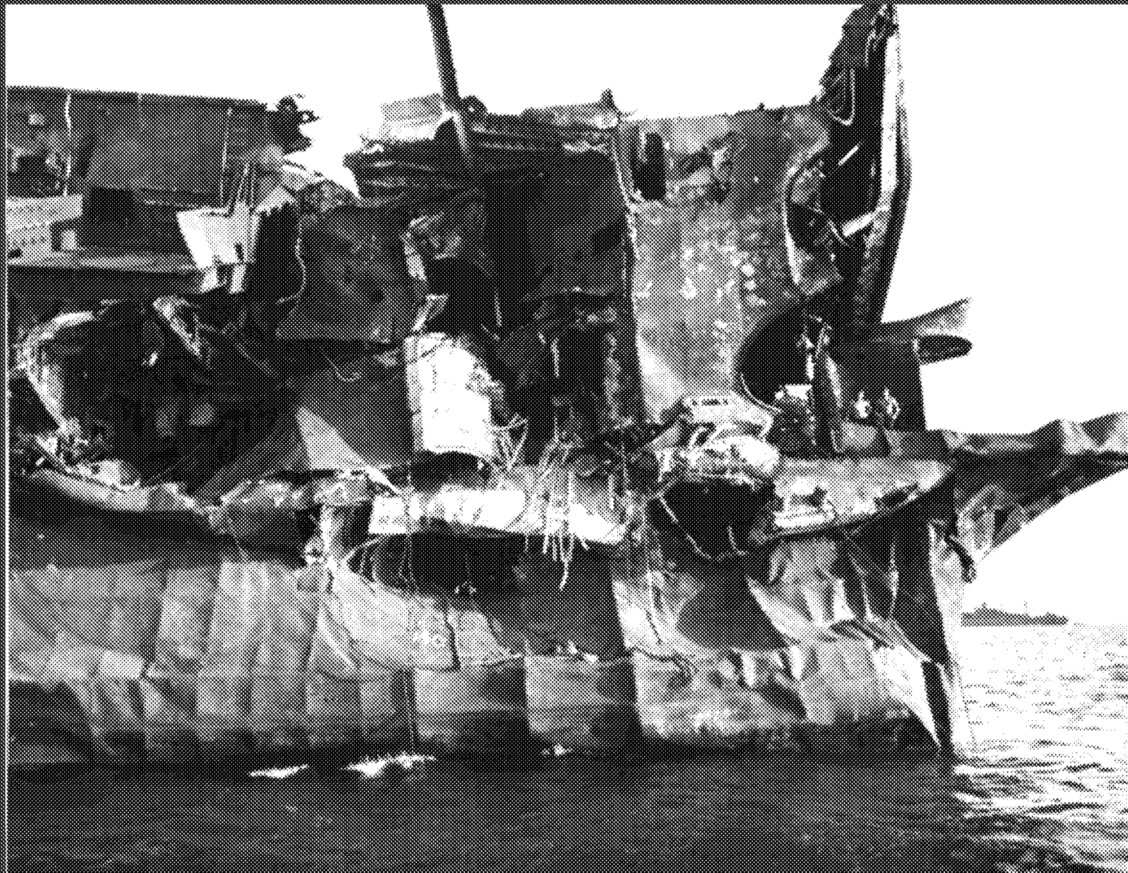


Photo # 80-G-627502 USS Independence burning after the Bikini "Able" test, 1 July 1946



USS Independence wreckage after the Able Shot blast, still smoking (NARA)



Radioactively contaminated USS Independence after A-bomb blast damage.

Note: Two sailors at far right. (NARA)

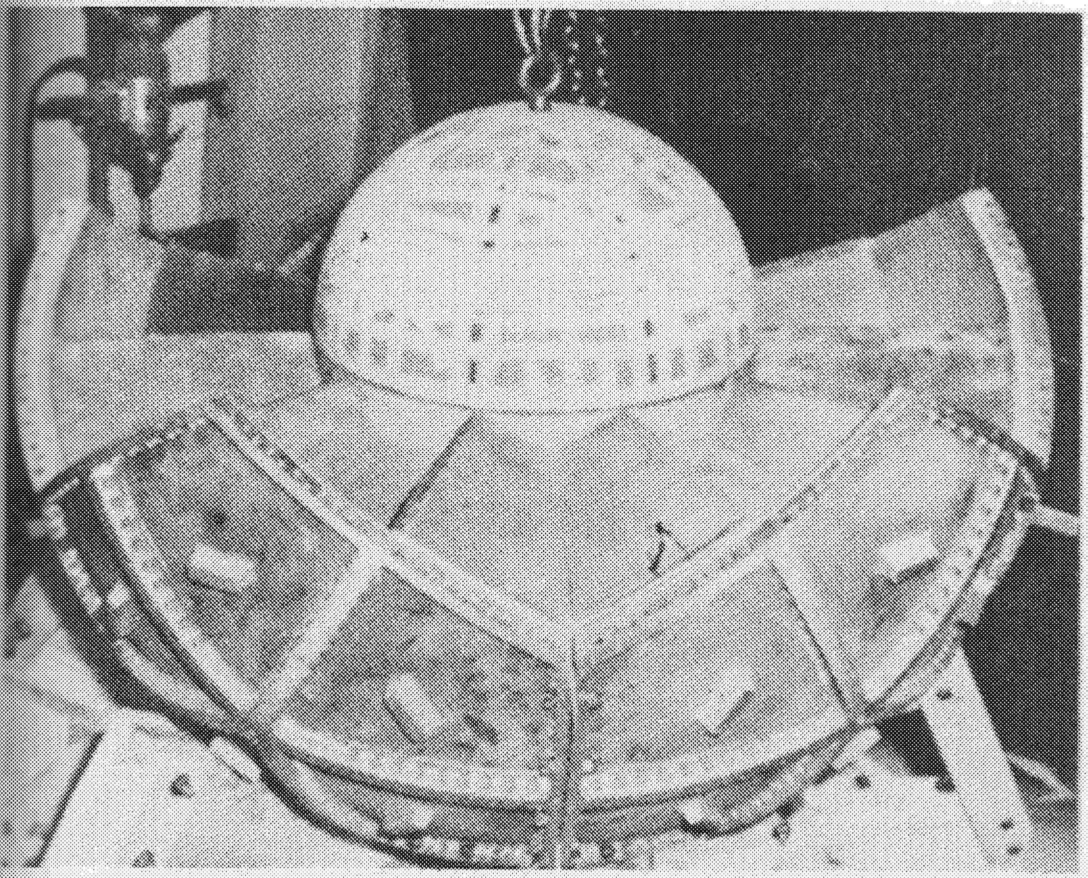


Figure 2.2 Interior components of *Fat Man* type implosion bomb. The spherical shell of twelve pentagonal sections contains explosive "lenses" surrounding a uranium tamper and plutonium core.

Radioactivity from the Pacific nuclear tests included:

- unfissioned plutonium and uranium
- scores of fission products
- activation products from neutron irradiation of materials like sand and sediment

Group of sailors wash down the highly contaminated deck of the captured German battleship USS Prinz Eugene (IX 300). The ship was so radioactive that it was later sunk. (NARA, Still Pictures Unit, Record Group 80-G, box 2228)

Crude efforts at decontaminating the radioactive fleet at sea proved futile

Navy decided to take 79 irradiated Crossroads ships to Hunters Point for "decontamination"

Aerial View of Hunters Point Naval Shipyard, 1940s, NARA

Bayview Hunters Point,
was then, and remains today,
a low-income community of color

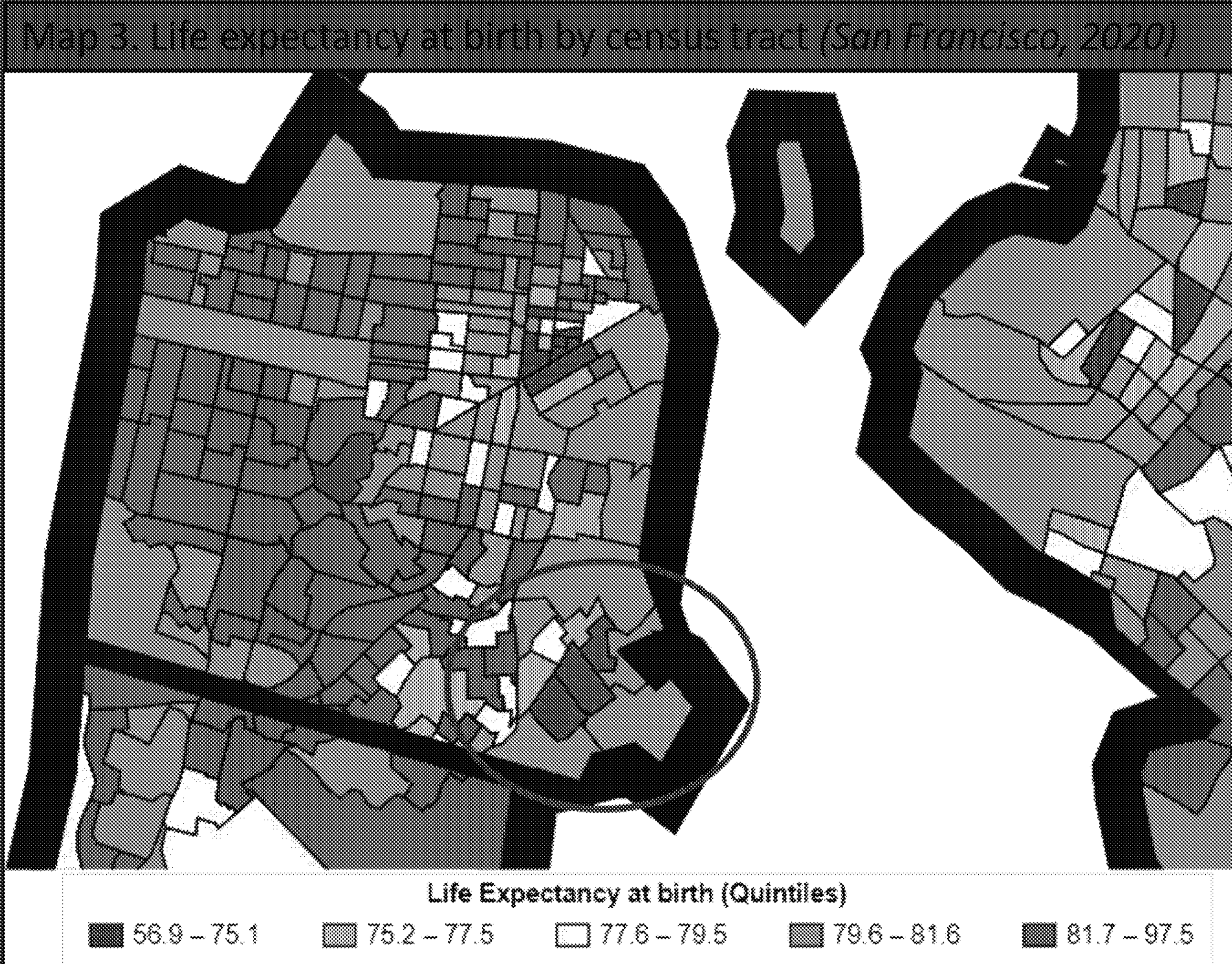
Map 1: Redlining map of San Francisco

Green= "Best", Blue = "Still Desirable", Yellow= "Definitely Declining", Red= "Hazardous"

Mapping Inequality: Redlining in New Deal America.

Redlining practices have resulted in BayView Hunters Point (BVHP) concentrating the highest density of Black people in San Francisco

Map 2: Areas with a majority race/ethnic population

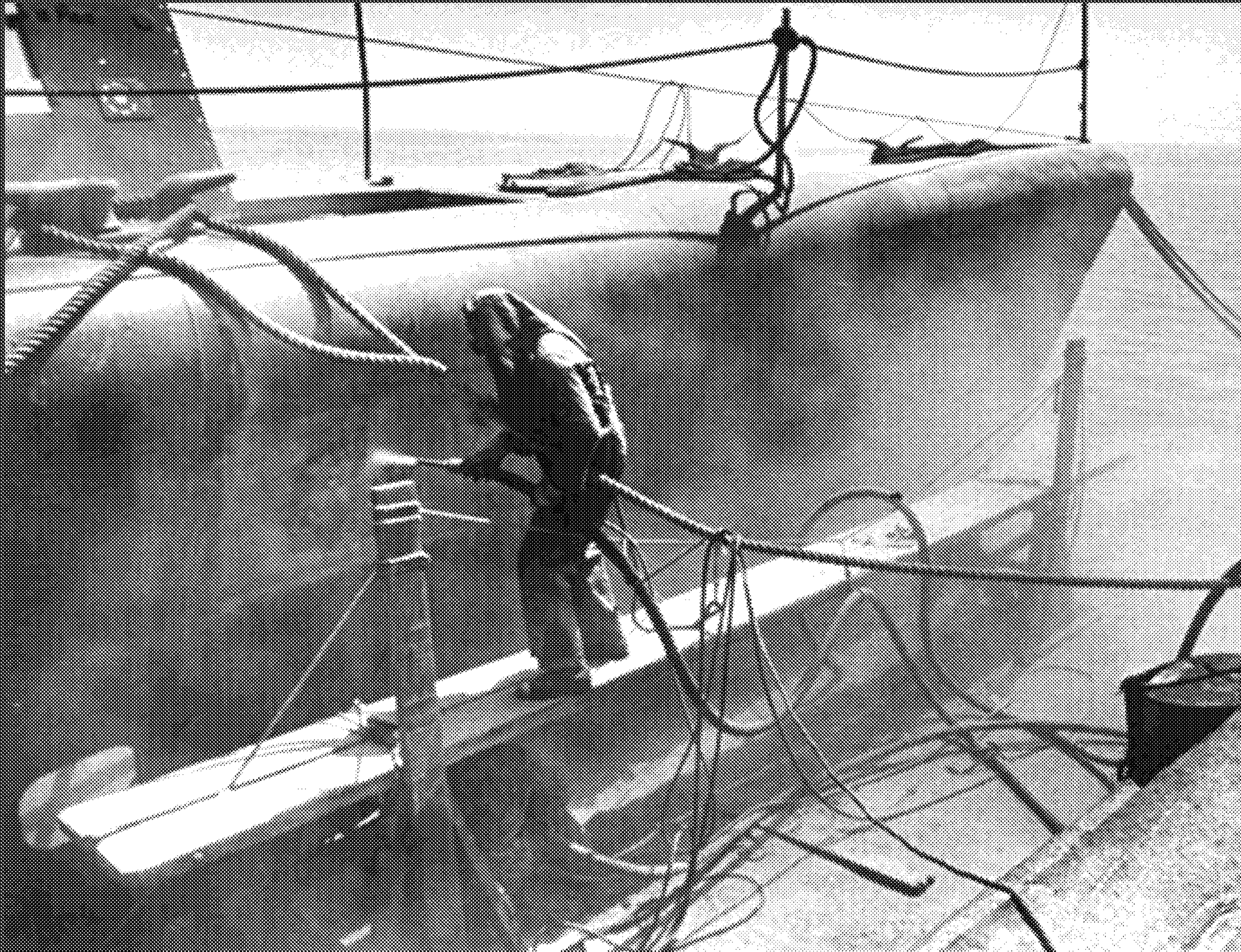


Life expectancy at birth by census tract (San Francisco 2020)

Map 5. Age-adjusted lung cancer incidence (San Francisco, 2013-17 Source: Greater Bay Area Cancer Registry)

Age-adjusted lung cancer incidence (San Francisco, 2013-2017 Source: Greater Bay Area Cancer Registry)

Drydock 4 at Hunters Point, 1950s (Todd Lappin)



Radioactive ships were brought into drydocks and sandblasted in the open air, with the potential to spread the contamination throughout Hunters Point

A worker sandblasts a radioactively contaminated vessel in one of the drydocks at HPNS. (Fritz Goro/Life Magazine Collection/Getty Images)

A sign in front of the Ex-USS Independence anchored at HPNS, reading "Personnel for Radioactive Ships Only" (NARA)

>600,000 Gallons of Radioactive Fuel Burned at HPNS

610,000 gallons of contaminated fuel oil from Navy ships exposed to nuclear weapons tests were burned in boilers on land at HPNS, where the contamination could be widely dispersed by air releases.

Navy workers crossing the boundary line. Credit: Fritz Goro / Life Magazine Collection / Getty Images

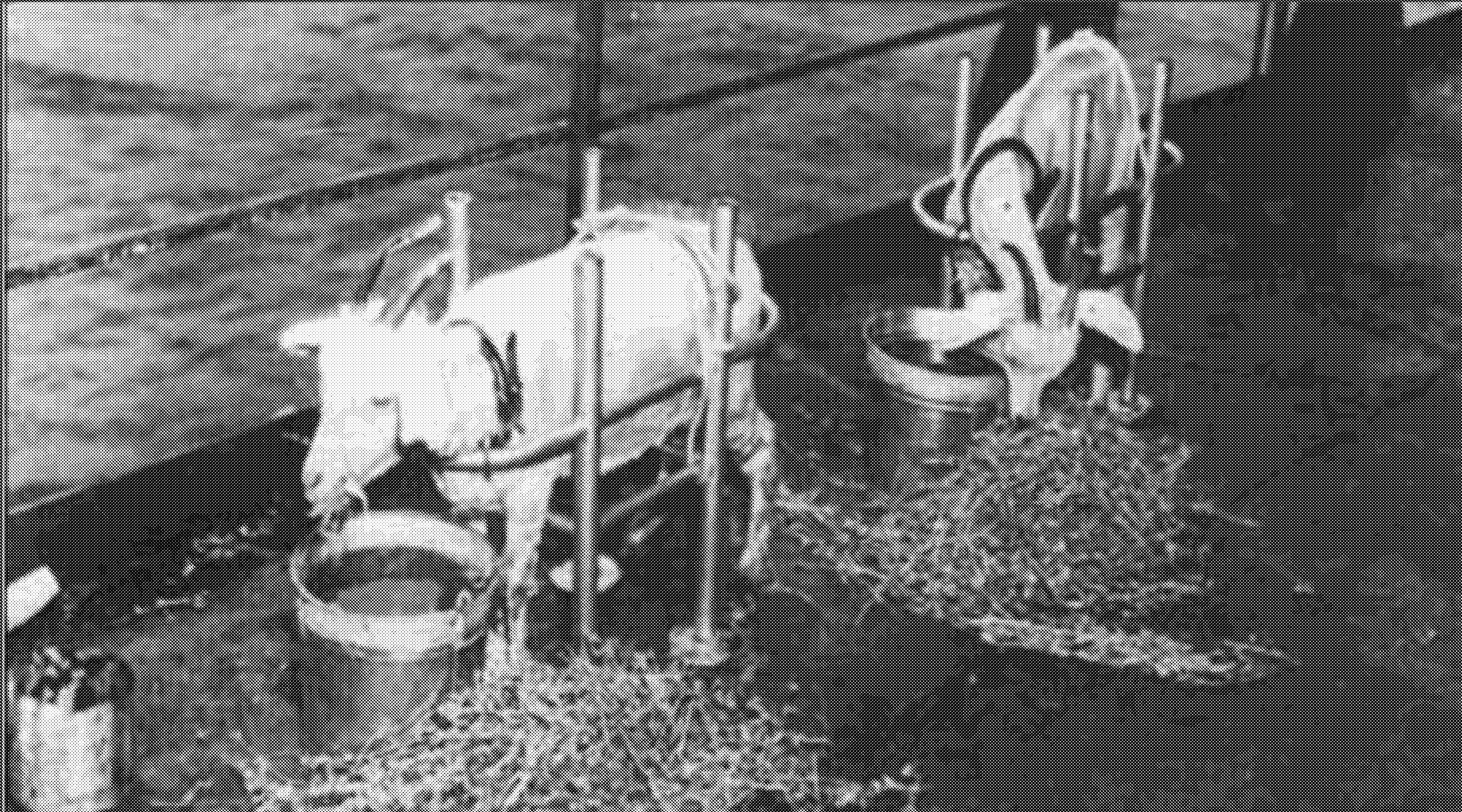
Sailors – and their clothing – contaminated by nuclear work at HPNS were washed at the site, with the contaminated rinse water going down the drains and leaking into the soil through breaks in the lines.

Naval Radiological Defense Laboratory

In addition to the decontamination of ships from the Pacific nuclear tests, the Naval Radiological Defense Laboratory was established at HPNS.

It participated in all Pacific nuclear tests from 1950-1958 as well as doing extensive research at HPNS with large quantities of radionuclides, including nuclear weapons debris brought back for analysis.

An array of animals were irradiated and injected with radioactivity at HPNS, potentially contaminating portions of the site by releases from excrement and incineration of carcases.



Goats confined to USS Niagara before the Baker Shot. They were left on board, in the detonation zone, for a number of days following the blast, the effects of which were later observed and documented. (NARA)

In addition, NRDL was allowed to possess extremely high amounts of radionuclides under its licenses

- 60,000 curies of strontium-90/yttrium-90
- 15,000 curies of cobalt-60
- 3,000 curies of cesium-137
- 2,426 pounds of depleted uranium
- 94 pounds of natural uranium
- 12 pounds of natural thorium
- 2 pounds of U-235
- 2,000 grams of plutonium-239

To put these large amounts into perspective

- **60,000 curies of strontium-90/yttrium-90**
  could contaminate more than ten trillion tons of soil at EPA's default Superfund preliminary remediation goal (PRG)

- **2,426 pounds of depleted uranium**
  could contaminate more than 200 million metric tons of soil above EPAs default Superfund preliminary remediation goal

- **2,000 grams of plutonium-239:**
  a millionth of an ounce if inhaled will cause cancer with a virtual 100% statistical certainty

HPNS was declared a Superfund site in 1989

The subsequent botched cleanup has been riddled with scandal and failure of oversight

The present crisis regarding the botched HPNS cleanup

I. EPA found evidence of falsification of radioactivity measurements made by Navy contractor Tetra Tech at 90-97% of HPNS survey units.

EPA did not publicly disclose this; PEER had to obtain the EPA findings under FOIA and make them public.

Tetra Tech Falsifications

97% of measurements were found to be suspect

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IX
75 Hawthorne Street
San Francisco, CA

December 27, 2017

George ("Pat") Brooks
US Department of the Navy
33000 Nixie Way, Bldg 50
San Diego, CA 92147

Dear Mr. Brooks:

Thank you for providing for review the *Draft Radiological Data Evaluation Findings Report for Parcels B and G Soil* ("Report"), Former Hunter's Point Naval Shipyard (HPNS), September 2017. The U.S. Environmental Protection Agency (EPA), the California Department of Toxic Substances Control (DTSC), and the California Department of Public Health (CDPH) have independently reviewed this report in detail with a technical team including national experts in health physics, geology, and statistics, and EPA's comments are attached.

In Parcel B, the Navy recommended resampling in 15% of soil survey units in trenches, fill, and building sites. EPA, DTSC, and CDPH found signs of potential falsification, data manipulation, and/or data quality concerns that call into question the reliability of soil data in an additional 76% of survey units, bringing to 90% the total suspect soil survey units in Parcel B. (These do not add exactly due to rounding) In Parcel G, the Navy recommended resampling 49% of survey units, and regulatory agencies recommended 49% more, for a total of 97% of survey units as suspect.

EPA Found Only 3% of Samples to Be Free of Falsification

Summary of EPA, DTSC, CDPH review of Parcel G Radiological Data Evaluation

	Trench	Fill	Building Sites	Total	% of total
Total Survey Units in Parcel G	63	107	32	202	100%
Navy recommended resampling	20	53	25	98	49%
EPA, CDPH, DTSC recommend resampling	39	54	5	98	49%
Total recommended resampling	59	107	30	196	97%
No signs of falsification found in data	4	0	2	6	3%
% of total recommended resampling	94%	100%	94%	97%	

EPA, CDPH, and DTSC review of Parcel B Rad Data Evaluation

	Trench	Fill	Building Sites	Total	% of total
Total Survey Units in Parcel B	70	110	17	197	100%
Navy recommended resampling	2	18	9	29	15%
Navy recommended reanalyzing archived samples	2	1	0	3	2%
EPA, CDPH, DTSC recommend resampling	55	87	7	149	76%
Total recommended resampling	57	105	16	178	90%
No signs of falsification found in data	13	5	1	19	10%
Regulators not yet reviewed	0	0	0	0	0%
% of total recommended resampling	81%	95%	94%	90%	

	Total	% of total	D-2	UC-1	UC-2	UC-3
Total Survey Units in Parcels UC-1,2,3 & D-2	80	100%	5	26	20	29
Navy recommended resampling	55	69%	4	14	13	24
Navy recommended reanalyzing archived samples	0	0%	0	0	0	0
DTSC recommended resampling	23	29%	1	12	6	4
Total recommended resampling	78	98%	5	26	19	28
No signs of falsification found in data	2	3%	0	0	1	1
% of total recommended resampling	98%		100%	100%	95%	97%

Unprecedented Falsification

"The vast scope of the signs of falsification found is unprecedented nationally."

- EPA Region IX

Navy 5-Year Review: Appendix B1. Regulatory Agency Interview Records, Hunters Point Naval Shipyard, 2019

Tetra Tech Scandal is just the Tip of the Iceberg

How did the Navy and EPA Fail to Catch Such Monumental Falsification for So Many Years?

These failures of oversight were not limited to the Tetra Tech matter, but extend to the whole cleanup.

II. EPA Repeatedly Approved Navy HPNS Cleanup Goals That Were Even at the Time Extremely Outdated, Non-protective & Inconsistent with EPA CERCLA Guidance, and Thus Violated CERCLA 120(a)(2)

Under Section 120(a)(2) of CERCLA, the Navy Is Required to Use Standards Consistent with EPA's Superfund Guidance, But EPA Failed to Require it to Do So

"No department, agency, or instrumentality of the United States may adopt or utilize any such guidelines, rules, regulations, or criteria which are inconsistent with the guidelines, rules, regulations, and criteria established by the [EPA] Administrator under this chapter."

EPA Has Historically Required Federal Agencies Comply with CERCLA 120(a)(2) and Employ Standards Consistent with EPA Guidance

Example:

"CERCLA section 120(a)(2) prohibits Federal Facilities from adopting or utilizing any rule, guidance or criteria applicable to CERCLA remedial actions that are inconsistent with EPA CERCLA remedial action requirements. This section makes clear that Federal Facilities are held to the same standards and requirements as non-federal facilities."

December 12, 1997, letter from Woolford and Luftig, EPA OSWER (OLEM predecessor) to DOE's Berube.

OLEM CERCLA Radiation Guidance Makes Clear That Cleanup Approaches from Other Agencies Should Not Be Used; Approaches That Do Not Follow OLEM Policies & Guidance Should Not Be Used

Q10. For CERCLA risk assessments at remedial sites, is it appropriate to use guidance or approaches developed by other Federal, State or Tribal Agencies or by International or National Organizations?

A. EPA has made the policy decision that risks from radionuclide exposures at remedial sites should be estimated in the same manner as chemical contaminants, which is consistent with EPA's remedial program implementing guidance (e.g., EPA 1997g, 1999d, 2000f). Consequently, approaches that do not follow the remedial program's policies and guidance should not be used at CERCLA remedial sites. Should regional staff have questions, they should consult with the Superfund remedial program's National Radiation Expert (Stuart Walker of OSRTI at the time this fact sheet was issued, at (703) 603-8748 or walker.stuart@epa.gov), before using guidance from other organizations that is not already incorporated into this and other EPA Superfund remedial program guidance.

OSWER 9285.6-20 "Radiation Risk Assessment at CERCLA Sites: Q&A," June 13, 2014

Q16. What calculation methods or multimedia radionuclide transport and exposure models are recommended by EPA for Superfund risk assessments?

A. The PRG calculators (U.S. EPA 2002a, 2007, 2009a), which are used to develop risk-based PRGs for radionuclides, are recommended by EPA for Superfund remedial radiation risk assessments.

OSWER 9285.6-20 "Radiation Risk Assessment at CERCLA Sites: Q&A," June 13, 2014

Despite the Requirements that Cleanup Standards be Consistent with EPA's CERCLA Guidance, the Navy is Using Standards that are Inconsistent with that Guidance.

Despite CERCLA 120(a)(2), EPA Region IX Rubber-Stamped These Improper Standards

The Navy's Hunters Point Release Criteria

RELEASE CRITERIA

Radionuclide	Surfaces			Soil[d] (pCi/g)				Water[h] (pCi/L)
	Equipment, Waste (dpm/100 cm²)[a]	Structures (dpm/100 cm²)[b]	Residual Dose (mrem/yr)[c]	Outdoor Worker (pCi/g)[e]	Residual Dose (mrem/yr)[c]	Residential (pCi/g)[e]	Residual Dose (mrem/yr)[c]	
Americium-241	100	100	18.7	5.67	0.8661	1.36	24.84	15
Cesium-137	5,000	5,000	1.72	0.113	0.2142	0.113	0.2561	119
Cobalt-60	5,000	5,000	6.01	0.0602	0.5164	0.0361	0.3918	100
Europium-152	5,000	5,000	3.21	0.13[f]	0.5018	0.13[f]	0.502	60
Europium-154	5,000	5,000	3.49	0.23[f]	0.9593	0.23[f]	0.9599	200
Plutonium-239	100	100	18.1	14.0	1.743	2.59	1.138	15
Radium-226	100	100	0.612	1.0[g]	6.342	1.0[g]	14.59	5[i]
Strontium-90	1,000	1,000	0.685	10.8	0.1931	0.331	1.648	8
Thorium-232	1,000	36.5	24.9	2.7	24.91	1.0[g] ~~1.69~~	25	15
Tritium	5,000	5,000	0.00053	4.23	0.00179	2.28	0.05263	20,000
Uranium-235+D	5,000	488	25	0.398	0.178	0.195	0.8453	30

Notes:

a These limits are based on AEC *Regulatory Guide 1.86* (1974). Limits for removable surface activity are 20 percent of these values.

b These limits are based on 25 mrem/yr, using RESRAD-Build Version 3.3 or *Regulatory Guide 1.86*, whichever is lower.

c The resulting dose is based on modeling using RESRAD-Build Version 3.3 or RESRAD Version 6.3, with radon pathways turned off.

d EPA PRGs for two future-use scenarios.

g Limit is 1 pCi/g above background, per agreement with EPA.

The HPNS remedial goals were put forward in an Action Memorandum and then repeatedly used in Records of Decision (RODs) that were approved by EPA. **The soil goals, however, came from EPA 1991 PRGs** and **the building standards from a 1974 AEC guidance (Reg. Guide 1.86) and 25 mrem/yr based on RESRAD**. *None of these were consistent with EPA guidance.* As the Navy stated:

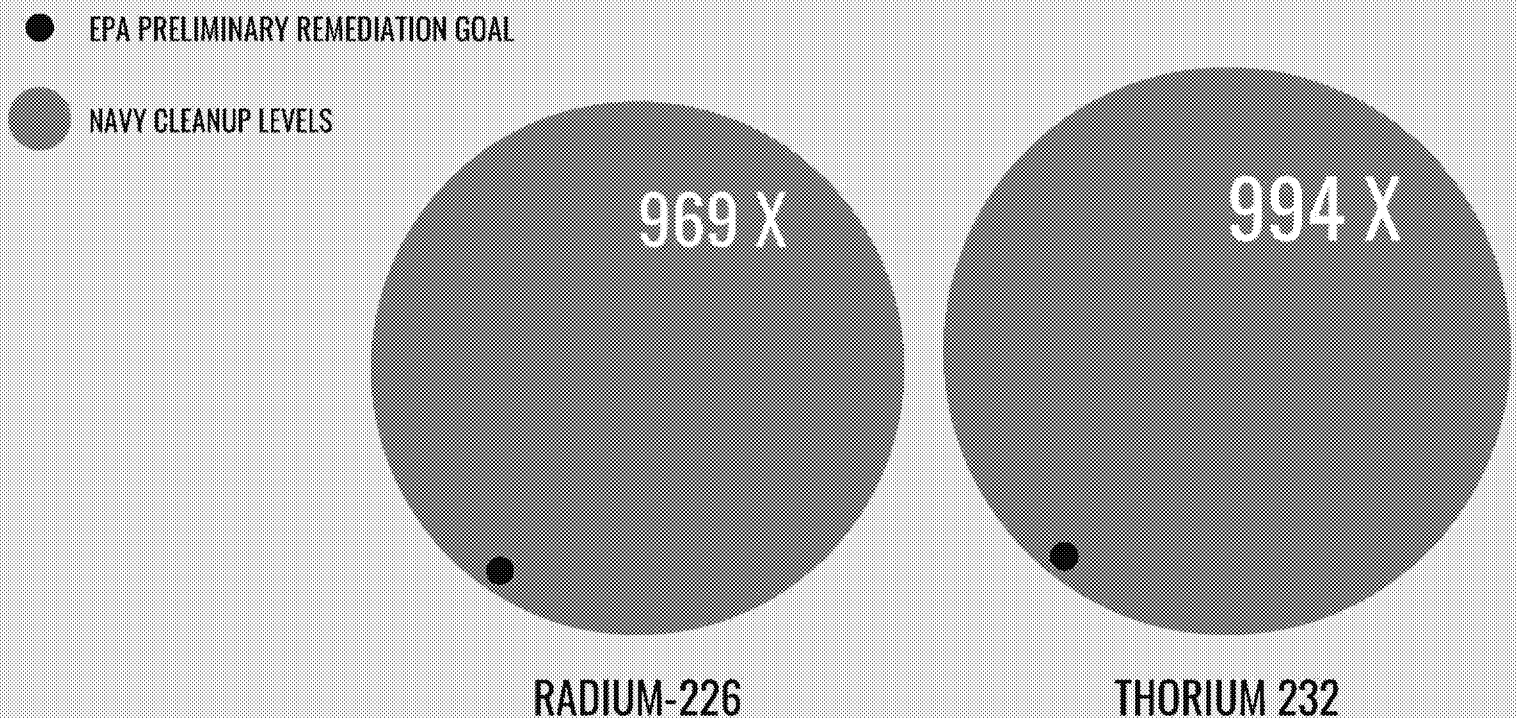
The cleanup goals presented in this AM were derived by considering the following:

- Soil cleanup goals: EPA decay-corrected PRGs (EPA, 1991)
- Radium-226 contamination in soils per agreement with EPA
- Radioactive contamination on structures: These limits are based on 25 millirem per year (mrem/y), using RESRAD or Atomic Energy Commission's (AEC's) *Regulatory Guide 1.86* (1974), whichever is lower.

Soil Cleanup Goals Are Extremely Outdated

Radionuclide	Navy Remediation Goals for Soil (pCi/g)	2021 EPA Default PRG for soil (pCi/g)	*How many times weaker are the Navy's Remediation goals?*
Radium-226	1.861	0.00192	**969** times weaker
Strontium-90	0.331	0.00477	**69** times weaker
Thorium-232	1.690	0.0017	**994** times weaker
Uranium-235	0.195	0.00708	**28** times weaker

NAVY CLEANUP LEVELS THAT ALLOW HUNDREDS OF TIMES MORE CONTAMINATION IN SOIL THAN EPA CLEANUP GOALS



The cancer risk from the Navy Soil Cleanup Standards is, according to the EPA's PRG Calculator, 2.12×10^{-3}, meaning
1 in every 473 people would get a cancer from the radioactive contamination.

This is 2,120 times higher than EPA's risk goal and 21 times higher than the upper end of the risk range.

Cancer Risk Estimates from EPA's Preliminary Remediation Goal (PRG) Calculator for Exposure to Soil at Navy's Cleanup Levels				
Radionuclide	**Navy's Hunters Point Residential Cleanup Levels for Soil (pCi/g)**	**EPA PRG Calculator Estimate of Cancer Risk from Navy's Hunters Point Residential Cleanup Levels**	**Ratio of the Cancer Risk from the Navy's HPNS Soil Cleanup Level to EPA's Highest Risk Allowed (1 in 10,000)**	**How Many Times Higher Cancer Risk is the Navy's HPNS Cleanup Level than EPA's Risk Goal (1 in 1,000,000)**
Americium-241 (Am-241)	1.360	2.83×10^{-6}	0.028	2.83
Cesium-137 (Cs-137)	0.141	3.52×10^{-6}	0.035	3.52
Cobalt-60 (Co-60)	0.252	8.84×10^{-6}	0.088	8.84
Europium-152 (Eu-152)	0.130	3.39×10^{-6}	0.034	3.39
Europium-154 (Eu-154)	0.230	4.93×10^{-6}	0.049	4.93
Plutonium-239 (Pu-239)	2.590	5.82×10^{-6}	0.058	5.82
Radium-226 (Ra-226)	1.861	9.74×10^{-4}	9.740	974
Strontium-90 (Sr-90)	0.331	6.94×10^{-5}	0.694	69.40
Thorium-232 (Th-232)	1.690	9.92×10^{-4}	9.920	992
Tritium (H-3)	2.280	1.96×10^{-5}	0.196	19.60
Uranium-235 (U-235)	0.195	3.18×10^{-5}	0.318	31.80
Total Risk		**2.12×10^{-3}**	**2.12×10^{1}**	**2.12×10^{3}**
pCi = picocuries		**1 in every 473 people will get cancer**	**21.2 times higher**	**2120 times higher**

The Navy's Soil Cleanup Standards Would Allow 332 millirem per year, the Equivalent of ~166 Chest X-rays Annually, Year After Year

The Navy soil standards, approved by EPA, would allow the public to receive essentially a chest X-ray every other day for decades, with no medical benefit, and no informed consent.

[Note that OLEM guidance declares any ARAR (Applicable or Relevant and Appropriate Requirements) over 12 millirem/year presumptively non-protective.]

(Radiation Q&A Q35)

Dose Estimates from EPA's Dose Compliance Calculator (DCC) for Exposure to Contamination in Soil at Navy's Hunters Point Cleanup Level				
Radionuclide	Navy's Hunters Point Cleanup Level for Soil (pCi/g)	EPA DCC level (pCi/g that will produce 1 mrem/yr)	EPA DCC Dose Estimate for Navy's Hunters Point Cleanup Level (mrem/yr)	Equivalent Number of Chest X-Rays Per Year
Americium-241 (Am-241)	1.360	6.42×10^{-2}	21.20	10.6
Cesium-137 (Cs-137)	0.141	6.16×10^{-1}	0.23	0.11
Cobalt-60 (Co-60)	0.252	1.75×10^{-1}	1.44	0.72
Europium-152 (Eu-152)	0.130	4.09×10^{-1}	0.32	0.16
Europium-154 (Eu-154)	0.230	4.10×10^{-1}	0.56	0.28
Plutonium-239 (Pu-239)	2.590	4.43×10^{-2}	58.40	29.2
Radium-226 (Ra-226)	1.861	1.67×10^{-2}	111.00	55.5
Strontium-90 (Sr-90)	0.331	4.88×10^{-2}	6.78	3.39
Thorium-232 (Th-232)	1.690	1.34×10^{-2}	126.00	63
Tritium (H-3)	2.280	1.30×10^{0}	1.75	0.88
Uranium-235 (U-235)	0.195	4.53×10^{-2}	4.30	2.15
Total			**332**	**166**
mrem = millirem				
pCi = picocuries				

The Navy's release criteria were supposedly based on 10^{-6} risk

But the criteria the Navy used--soil PRGs from 1991 and the Atomic Energy Commission's 1974 Reg. Guide 1.86 values for buildings--were wrong and inconsistent with EPA CERCLA guidance, in violation of CERCLA 120(a)(2) and greatly exceed 10^{-6}, indeed exceed the upper limit of the risk range.

The errors need to be corrected and current 10^{-6} PRGs used

10^{-6} is the CERCLA Point of Departure

"***The 10^{-6} risk level shall be used as the point of departure for determining remediation goals*** for alternatives when ARARs are not available or are not sufficiently protective because of the presence of multiple contaminants at a site or multiple pathways of exposure" 40 CFR 300.430(e)(2)(i)(A)(2)

To Fall Back From 10^{-6} Requires Consideration of the 9 Balancing & Other CERCLA Criteria-- Which Has Never Been Done at HPNS

"*Nine criteria for evaluation.* The analysis of alternatives under review shall reflect the scope and complexity of site problems and alternatives being evaluated and consider the relative significance of the factors within each criteria."

40 CFR 300.430(e)(9)(iii)

The Nine CERCLA Threshold, Balancing, & Modifying Criteria

1. Overall protection of human health and the environment
2. Compliance with ARARs (applicable or relevant and appropriate standards)
3. Long-term effectiveness and permanence
4. Reduction of toxicity, mobility or volume
5. Short-term effectiveness
6. Implementability
7. Cost
8. State acceptance
9. *Community acceptance*

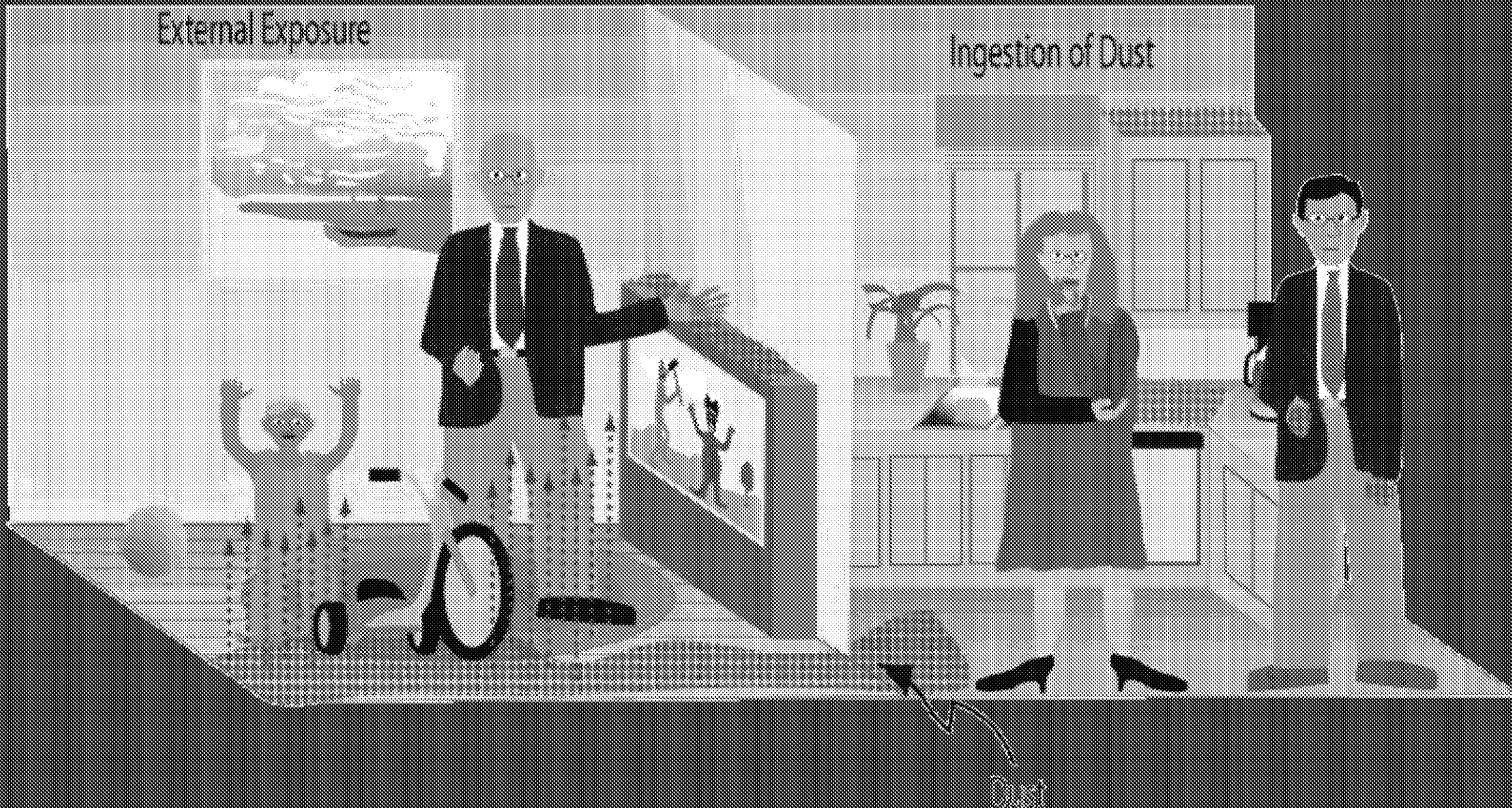
Current Time Urgent Matter

Despite CERCLA 120(a)(2) requiring the use of cleanup guidance consistent with EPA's, the Navy is refusing to use EPA's Building PRG Calculator for setting cleanup standards for contaminated buildings at HPNS. We have reason to believe--in part because of EPA strenuous resistance to providing in a timely fashion documents under FOIA related to the Navy-EPA disagreement--that the Region may be intending to cave in to Navy demands on the matter, and to do so without informing and getting approval from OLEM top leadership.

Adverse National Impacts Were This to Happen

This could not only place people in the Hunters Point area at risk but could impact cleanup of large numbers of other contaminated sites across the country, where Responsible Parties have been pushing to use less protective standards not consistent with EPA's guidance. This pending action could undermine EPA authority nationally.

Two Main Pathways for Exposure to Radioactivity in Contaminated Buildings



Navy Cleanup Goals for Fixed External Radiation Inside Buildings Are Extremely Outdated, Inconsistent with EPA Guidance, & Non-protective

Radionuclide	Navy's Hunters Point Release Criterion for Buildings and Structures (dpm/100 cm^2)	EPA Building Preliminary Remediation Goal (dpm/100 cm^2)	How many times weaker are the Navy's Remediation goals?
Cesium-137	5000	11.21	**446** times weaker
Cobalt-60	5000	1.27	**3,924** times weaker
Europium-152	5000	1.74	**2,876** times weaker
Europium-154	5000	2.14	**2,341** times weaker
Uranium-235	488	7.17	**68** times weaker

The Navy's Building Remedial Goals for External Contamination Are Vastly Less Protective than Those Specified by EPA Guidance

The Navy cleanup levels for external contamination would produce cancer risks, according to EPA's BPRG calculator, of ~1×10^{-2} -- ~1 in every 100 people exposed would get a cancer from the contamination.

That is about 10,000 times higher than the EPA risk goal and about 100 times higher than the upper limit of the risk range.

Cancer Risk Estimate from EPA's Building Preliminary Remediation Goal (BPRG) Calculator for External Exposure to Radiation Inside Buildings at Navy's HPNS Cleanup Levels				
Radionuclide	**Navy's Hunters Point Cleanup Level for Buildings (pCi/cm^2)**	**Residential Cancer Risk from Navy HPNS Building Cleanup Level, Using EPA BPRG Calculator**	**Ratio of the Cancer Risk from the Navy's HPNS Building Cleanup Level to EPA's Highest Risk Allowed (1 in 10,000)**	**How Many Times Higher Cancer Risk is the Navy's HPNS Cleanup Level than EPA's Risk Goal (1 in 1,000,000)**
Americium-241 (Am-241)	0.451	1.70×10^{-5}	0.2	17
Cesium-137 (Cs-137)	22.523	4.46×10^{-4}	4	446
Cobalt-60 (Co-60)	22.523	3.92×10^{-3}	39	3,920
Europium-152 (Eu-152)	22.523	2.88×10^{-3}	29	2,880
Europium-154 (Eu-154)	22.523	2.34×10^{-3}	23	2,340
Plutonium-239 (Pu-239)	0.451	1.40×10^{-5}	0.1	14
Radium-226 (Ra-226)	0.451	3.72×10^{-5}	0.4	37
Strontium-90 (Sr-90)	4.505	3.25×10^{-10}	0	0
Thorium-232 (Th-232)	0.164	2.74×10^{-5}	0.3	27
Uranium-235 (U-235)	2.198	6.81×10^{-5}	0.7	68
Total Risk		**9.75×10^{-3}**	**97.5**	**9,750**
pCi = picocuries		**1 in every 103 people will develop cancer**	**97.5 times higher**	**9,750 times higher**

Navy Cleanup Goals for Removable Contamination (Settled Dust) in Buildings Are Extremely Outdated, Inconsistent with EPA Guidance, & Non-protective

Radionuclide	Navy's Hunters Point Release Criterion for Buildings and Structures (dpm/100 cm^2)	EPA Building Preliminary Remediation Goal (dpm/100 cm^2)	How many times weaker are the Navy's Remediation goals?
Cesium-137	1000	0.744	**1,283** times weaker
Cobalt-60	1000	0.779	**1,345** times weaker
Europium-152	1000	0.539	**1,854** times weaker
Europium-154	1000	1.170	**855** times weaker
Uranium-235	97.6	0.024	**4,148** times weaker

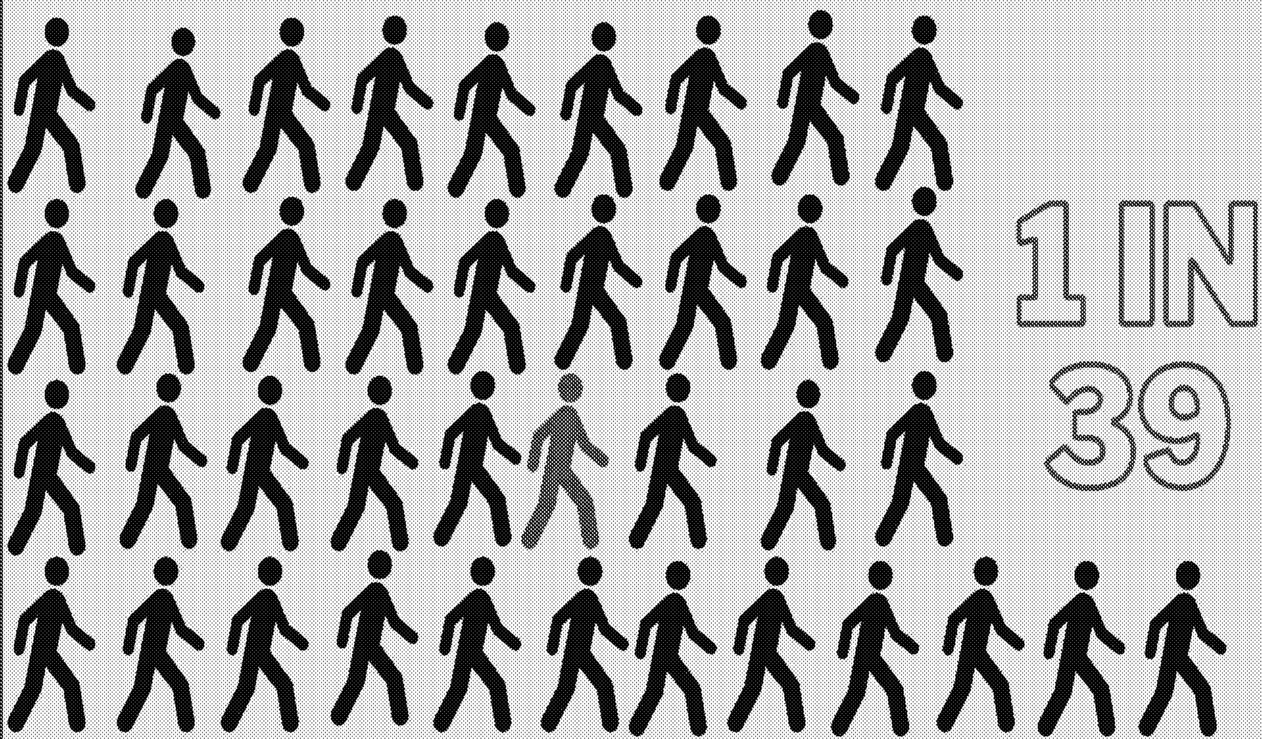
The Navy's Building Remedial Goals for Removable Contamination Are Vastly Less Protective than Those Specified by EPA Guidance

The Navy cleanup levels for settled dust would produce cancer risks, according to EPA's BPRG calculator, of 1.6×10^{-2} -- 1 in every 62 people exposed would get a cancer from the contamination.

That is 16,000 times higher than the EPA risk goal and 160 times higher than the upper limit of the risk range.

Cancer Risk Estimates from EPA's Building Preliminary Remediation Goal (BPRG) Calculator for Exposure to Removable Contamination Inside Buildings at Navy's Hunters Point Cleanup Levels				
Radionuclide	Navy's Hunters Point Cleanup Level for Buildings (pCi/cm^2)	Risk to Residents Using EPA Building PRG Calculator	How Many Times Higher Cancer Risk is the Navy's Hunters Point Cleanup Levels than EPA's Maximum Allowable Risk Level (1 in 10,000)	How Many Times Higher Cancer Risk is the Navy's Hunters Point Release Criterion Than EPA's Risk Goal (1 in 1,000,000)
Americium-241 (Am-241)	0.090	9.21×10^{-4}	9.2	**921**
Cesium-137 (Cs-137)	4.505	1.28×10^{-3}	12.8	**1280**
Cobalt-60 (Co-60)	4.505	1.34×10^{-3}	13.4	**1340**
Europium-152 (Eu-152)	4.505	1.86×10^{-3}	18.6	**1860**
Europium-154 (Eu-154)	4.505	8.55×10^{-4}	8.6	**855**
Plutonium-239 (Pu-239)	0.090	9.81×10^{-4}	9.8	**981**
Radium-226 (Ra-226)	0.090	3.29×10^{-3}	32.9	**3290**
Strontium-90 (Sr-90)	0.901	7.81×10^{-4}	7.8	**781**
Thorium-232 (Th-232)	0.033	6.11×10^{-4}	6.1	**611**
Uranium-235 (U-235)	0.440	4.14×10^{-3}	41.4	**4140**
Total Risk		**1.61×10^{-2}**	**1.6×10^{2}**	**1.6×10^{4}**
pCi = picocuries		**1 out of 62 people will get cancer**	**160.6 times higher**	**16,059 times higher**

The Navy building cleanup goals, for external contamination and settled dust combined, would produce 1,861 millirem/year, the equivalent of 930 chest X-rays annually, according to EPA's Building Dose Compliance Calculator.



The **combined cancer risk** from the external and removable contamination allowed under the Navy's building cleanup standards, according to the EPA BPRG calculator

The Nonprotective HPNS Cleanup Standards Also Have Contributed to Radioactive Waste Being Shipped to Disposal Sites Not Licensed for LLRW

This is part of a larger national issue involving troubling efforts within EPA to allow radioactive waste to be disposed of in Subtitle C, and perhaps even Subtitle D, landfills.

EPA Refusal to Admit & Fix the Cleanup Standards Errors

Rather than admit it made an error in approving the Navy's woefully non-protective cleanup standards for soil and buildings, and committing to fixing them, EPA is instead misusing the 5-Year Review process to allow contamination levels 100 times higher.

III. Navy & EPA Quietly Shifted Remedy from Cleanup to Coverup

Navy shifts from remediating to covering up contamination

The 1997 Record of Decision (ROD) for Parcel B called for excavation and off-site disposal of contaminated soil. (1997 Parcel B ROD, p. 49, 65)

Work at Parcel B found far more contamination than the Navy had anticipated. (Amended Parcel B ROD, p. 1-5)

In the 2009 Amended ROD for Parcel B, the Navy changed its remedy to rely on covering rather than removing contamination:

> **"…<u>the consideration of parcel-wide covers to address soil contamination instead of excavation represents a fundamental change in the scope of the remedy for soil</u>."** (Amended Parcel B ROD, p. 1-4)

Remedy now relies primarily on “durable covers,” which are defined in the RODs as 2 feet (or in some cases 3) of “clean soil” <u>or</u> 4 inches of asphalt.

Among the Key 9 Criteria are Community Acceptance

"*Community acceptance.* This assessment includes determining which components of the alternatives interested persons in the community support, have reservations about, or oppose. This assessment may not be completed until comments on the proposed plan are received."

40 CFR 300.430(e)(9)(iii)(I)

Violation of Community Acceptance

(one of the 9 CERCLA Criteria)

Rather than clean up HPNS to the most protective standards to allow for unrestricted use, much of the contamination will now be left in place and unenforceable restrictions will be placed on the future uses of the site, contrary to official San Francisco policy.

Proposition P: Public Overwhelmingly Supports Highest Cleanup Standards, Unrestricted Use

Passed in 2000 with 86.4% in favor

"While the federal government is required by law to clean up the Shipyard, the **Navy says it will cost too much to do a thorough job**. **Instead, the Navy plans to leave behind so much contamination that it will increase the risk for cancer resulting from exposure to the property, requiring the construction of barriers and the restriction of future land uses."**

"Hunters Point Shipyard [must] be **cleaned to a level which would enable the unrestricted use of the property - the highest standard for cleanup established by the United States Environmental Protection Agency."**

SF Board of Supervisors Adopts Prop P as Official City and County Policy

"WHEREAS, **Although the federal government is required by law to clean up the Shipyard, the Navy says it will cost too much money to do a thorough job. Instead, the Navy plans to leave behind so much contamination that the property may expose occupants and visitors to an unacceptable risk of cancer unless the Navy imposes legal restrictions on land use and constructs physical barriers**; and

...

WHEREAS, The **United States government should be held to the highest standards of accountability for its actions;** and

WHEREAS, **The United States Navy has demonstrated that it is not committed to responsible site management or cleanup and *many in the Bayview Hunters Point community believe the department's disdain for its duties in this neighborhood stems from the racial make-up of its residents*;** and

WHEREAS **The Hunters Point Bayview community wishes the Hunters Point Shipyard to be cleaned to a level which would enable the unrestricted use of the property - the highest standard for cleanup established by the United States Environmental Protection Agency**; and

RESOLVED, That the Board hereby declares that **Proposition P ... shall be the official policy of the City regarding the remediation of the Shipyard and sets forth a standard of remediation acceptable to the community**;

Thin Covers Are Ineffective at Preventing Exposure to Contaminants

Much of HPNS will be dirt with vegetation growing on it.

Large Portions of HPNS are Soil With Vegetation

March 2017, Google Earth

August 2017, Google Earth

Vegetation growing at HPNS

March 2017, Google Earth

HPNS Development Plans have always included large areas of soil with vegetation

Source: Indy Media

ED_006060B_00000533-00080

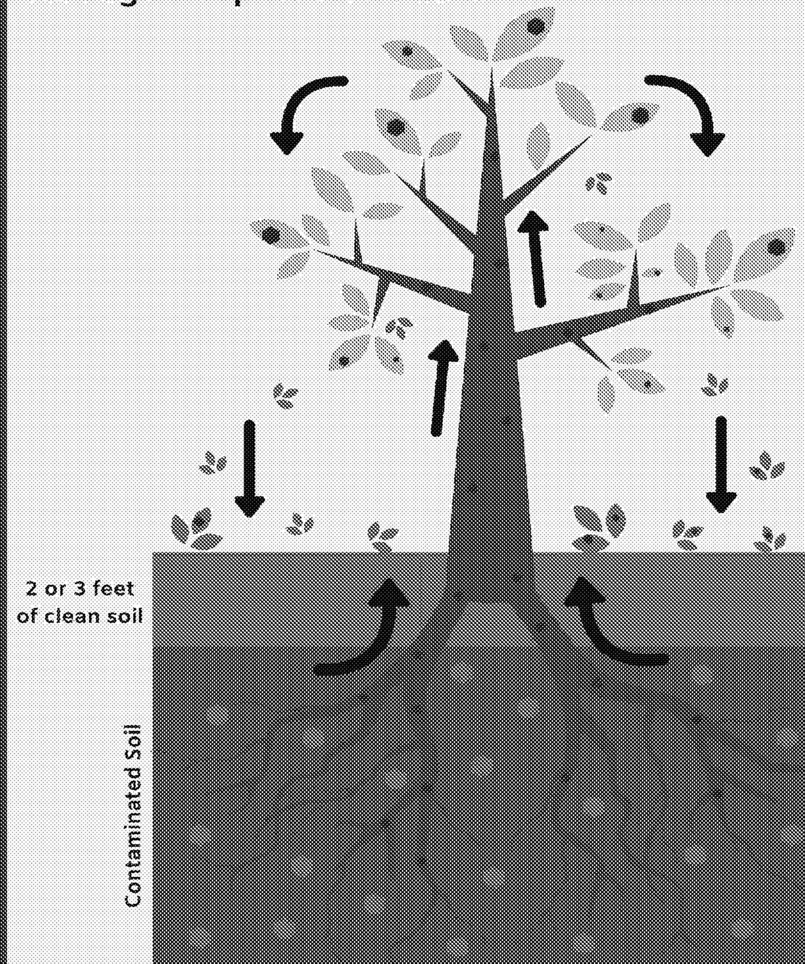
And that remains true to this day

Source: April 26, 2018 San Francisco Planning Commision presentation on Candlestick Point and Hunters Point Shipyard

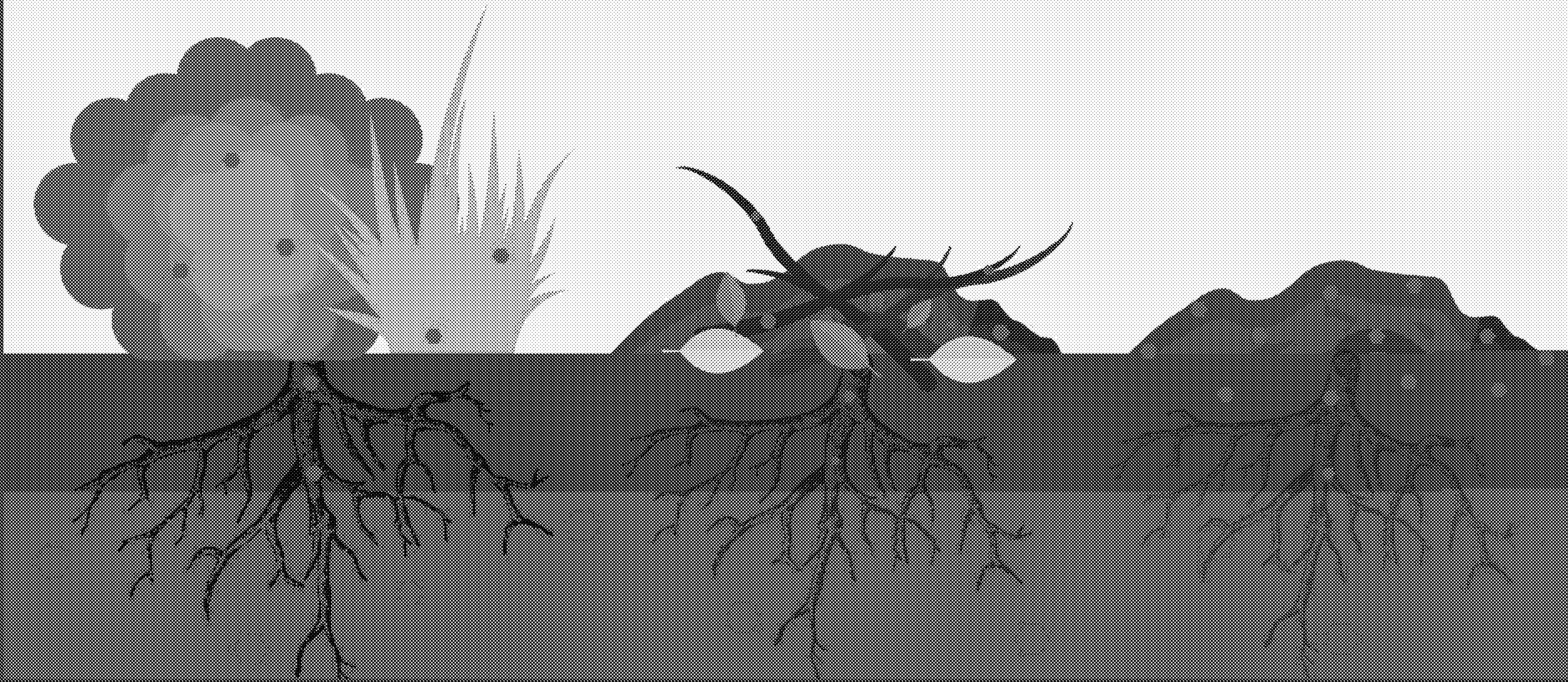
Source: April 2 & 9, 2018 presentation on Full CAC Candlestick Point and Hunters Point Shipyard Project Update

There are numerous mechanisms by which contaminants can be brought back to the surface

Uptake of Contaminants to Soil Surface Through Deep Rooted Plants



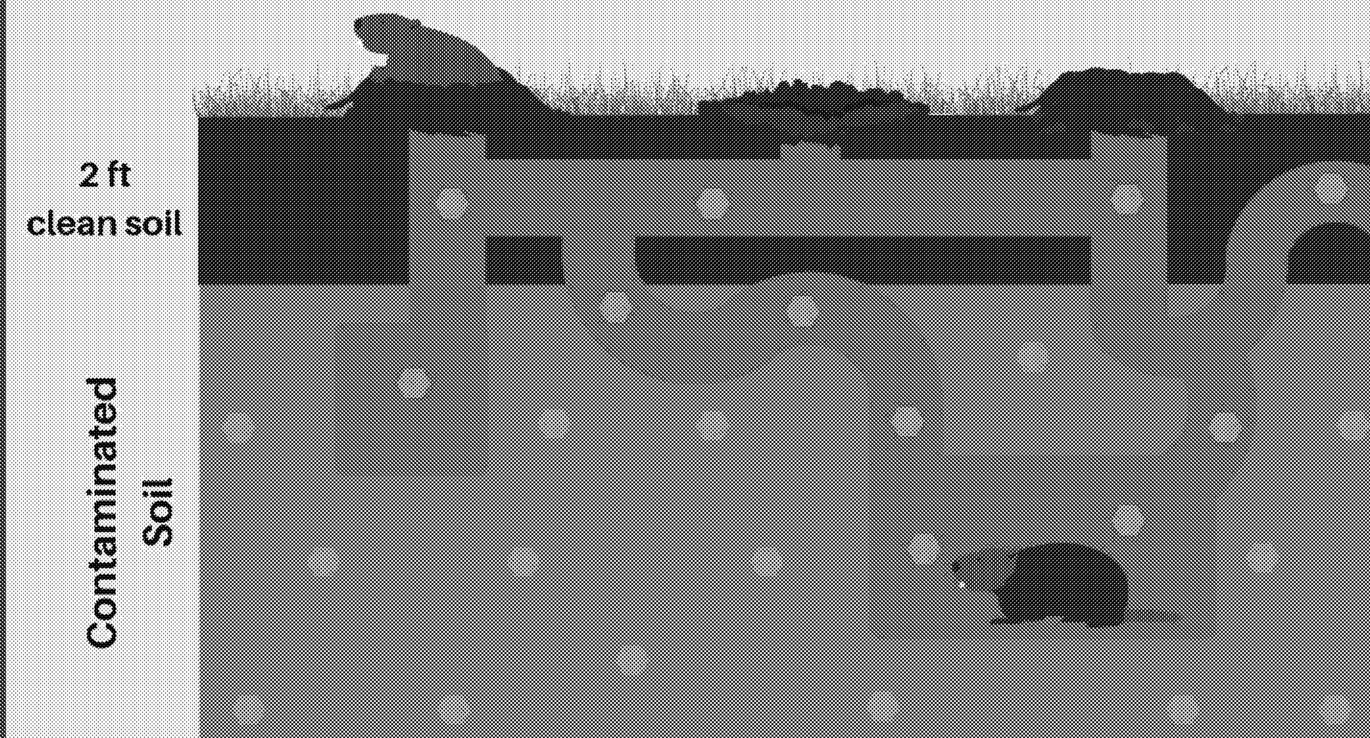
Shrubs, Bushes, and Other Landscaping Vegetation Can Draw Contaminants from Beneath the Soil Cover, and Decay of the Plant Matter Can Result in Contamination of Top Soil



There Are Numerous Other Mechanisms Which Render Soil Covers Useless

Bioturbation from Burrowing Animals Can Breach Shallow Soil Barriers and Prevent the Isolation of Contamination

= Contamination



Photograph 15. Large, collapsed burrow near revetment crest in central portion. Second burrow entry at lower left corner of photograph. Burrow scheduled for repair.

In the short time since soil covers have been installed at IR 07/18 (2011), instances of barrier breach by burrowing animals have already occurred

Photos taken on March 1st, 2013

Source: Navy Third Five-Year Review, HPNS

Growing fruits and vegetables
is common in
the Bayview/Hunters Point area.

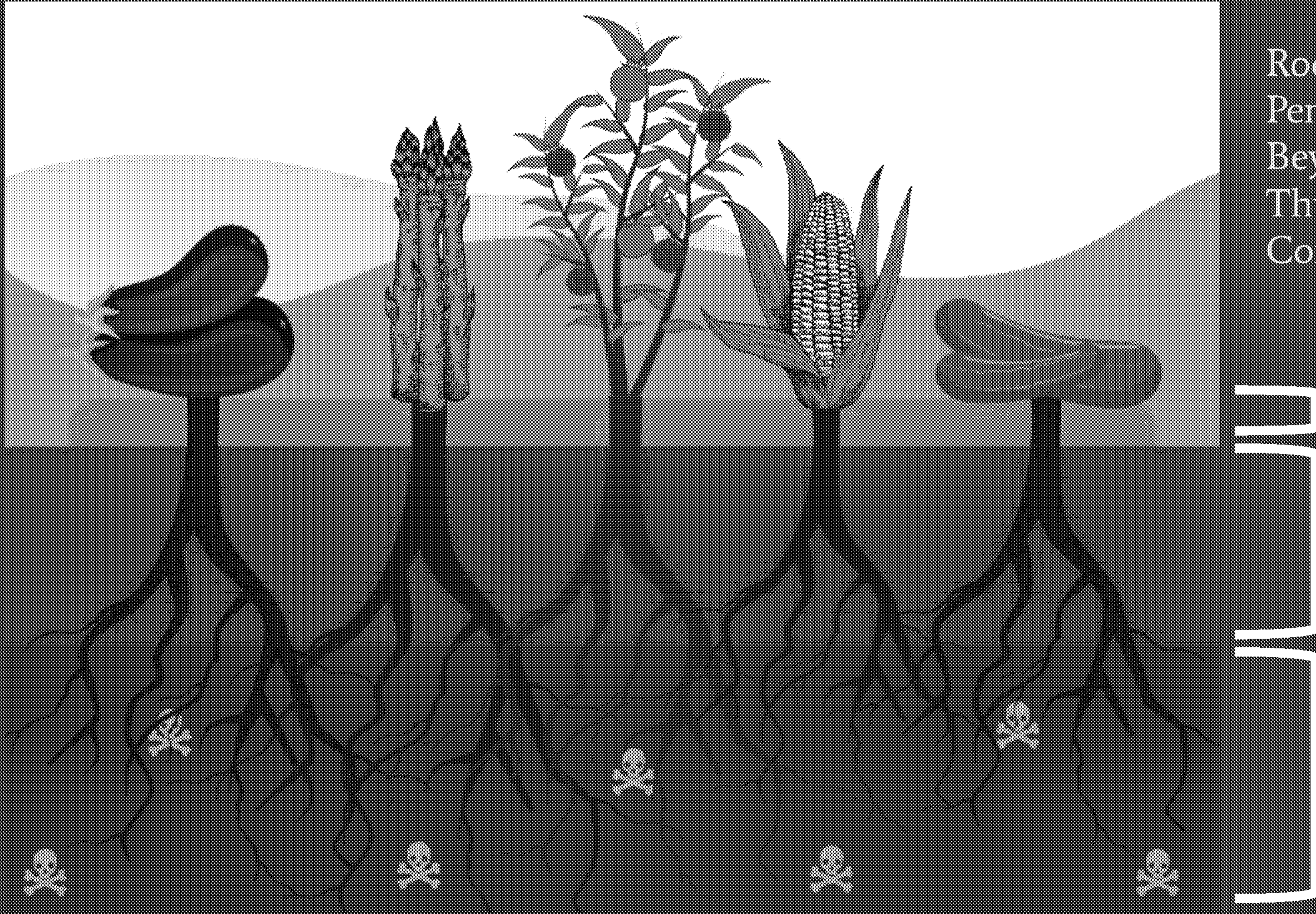
Corn and other produce grown at Quesada Community Gardens in Bayview/Hunters Point neighborhood

Source: Quesada Gardens

Children growing produce in the soil of a Bayview/Hunters Point street median

Source: Quesada Gardens

Roots of Vegetables Penetrate Depths Beyond 2 Feet, and Thus Can Absorb Contaminants



EPA Tries to Get Around This by Claiming That All Gardens Will Be Raised Beds With Impermeable Bottoms

Completely unenforceable; nothing can grow under such circumstances; a regulatory fiction designed to allow vastly higher concentrations of contaminants than permitted for unrestricted residential use.

Even With the Garden Pathway Turned Off in the PRG Calculator, the Cancer Risks from the Navy Soil Cleanup Levels Exceed the CERCLA Risk Goal by 350 Times and Also Exceed the Normal EPA Upper Limit of the Risk Range.

Cancer Risk Estimates from EPA's Preliminary Remediation Goal (PRG) Calculator for Exposure to Soil at Navy's Cleanup Levels With No Garden				
Radionuclide	**Navy Hunters Point Residential Cleanup Levels for Soil (pCi/g)**	**EPA PRG Calculator Estimate of Cancer Risk from Navy's Hunters Point Residential Cleanup Levels**	**Ratio of the Cancer Risk from the Navy's HPNS Soil Cleanup Level to EPA's Highest Risk Allowed (1 in 10,000)**	**How Many Times Higher Cancer Risk is the Navy's HPNS Cleanup Level than EPA's Risk Goal (1 in 1,000,000)**
Americium-241 (Am-241)	1.360	5.99×10^{-7}	0.006	0.60
Cesium-137 (Cs-137)	0.141	2.33×10^{-6}	0.023	2.33
Cobalt-60 (Co-60)	0.252	7.63×10^{-6}	0.076	7.63
Europium-152 (Eu-152)	0.130	3.36×10^{-6}	0.034	3.36
Europium-154 (Eu-154)	0.230	4.87×10^{-6}	0.049	4.87
Plutonium-239 (Pu-239)	2.590	6.83×10^{-7}	0.007	0.68
Radium-226 (Ra-226)	1.861	1.45×10^{-4}	1.450	145.00
Strontium-90 (Sr-90)	0.331	7.87×10^{-8}	0.001	0.08
Thorium-232 (Th-232)	1.690	1.72×10^{-4}	1.720	172.00
Tritium (H-3)	2.280	9.61×10^{-6}	0.096	9.61
Uranium-235 (U-235)	0.195	4.26×10^{-6}	0.043	4.26
Total Risk		**3.50×10^{-4}**	**3.50×10^{0}**	**3.50×10^{2}**
		1 in every 2850 people will get cancer	**3.5 times higher**	**350 times higher**

With the Garden Pathway Included, the Risk Associated with the Navy Remediation Goals is Far, Far Outside the Acceptable Risk Range

When the garden pathway is included, as it should be, the PRG-based risk is 2×10^{-3}, far, far above the upper end of acceptable risk levels.

When chemicals are included, as they must be, the risk is even further into the the 10^{-3} range, vastly exceeding acceptable risk.

EPA's National Chemical Regional Screening Levels Need to Include the Garden Pathway, as the Radionuclide PRGs Do

For years there has been internal recognition at EPA that it needs to include the garden pathway in its Regional Screening Levels (RSLs) for chemicals, paralleling what the Radionuclide PRGs have long done. Direction should be given to initiate a scientifically thorough process of doing so. This is particularly important because communities of color disproportionately rely on homegrown fruits and vegetables.

[Adding the homegrown produce pathway for toxic chemicals will require, as the Rad PRGs have done, use of extensive actual measured values for root uptake of the various contaminants into different types of edible plants (Bv-wet values), and not instead resorting to a simple, non-empirical formula based on K_{ow}, that has been shown to be highly inaccurate.]

Coverup, not Cleanup of Contamination

Original cleanup promise: removal of contaminated soil

Contamination was found to be ubiquitous and cleanup costs higher than anticipated, so Navy modified cleanup plan to rely on covering contamination with 2 feet of "clean" soil or 4 inches of asphalt

Now, majority of contamination will be left in place on site, beneath a thin soil or asphalt cover

Development of the site will require tearing up the thin soil or asphalt covers and the contaminated soil beneath in order to build residences, shops, utility infrastructure, etc.

The years or decades of intense construction, involving tearing up the soil and asphalt covers and existing building foundations and digging deep into the contaminated soil beneath will produce potential for widespread dispersal of contamination and exposures to people.

The planned redevelopment project would be the largest in San Francisco since the 1906 earthquake

IV. The Navy and EPA have ignored the potential for widespread contamination and the presence of most radionuclides of concern at HPNS

The Entire Site Has Significant Potential for Contamination

Many activities occurred over the decades which likely led to widespread dispersal of contamination:

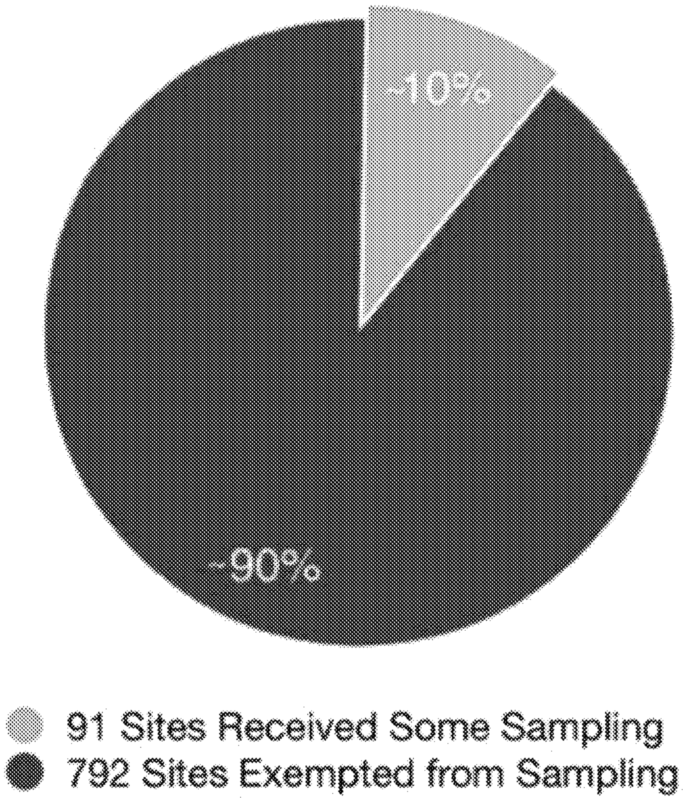
- ➔ Sandblasting of radioactive ships
- ➔ Burning of contaminated fuel oil in HPNS boilers
- ➔ Use of wide array of radionuclides for nuclear research at NRDL
- ➔ Extensive earth moving for cleanup and construction activities
- ➔ Disposal and "recycled use" of radioactive sandblast grit

BUT Only ~*10%* of Sites Received Any Sampling

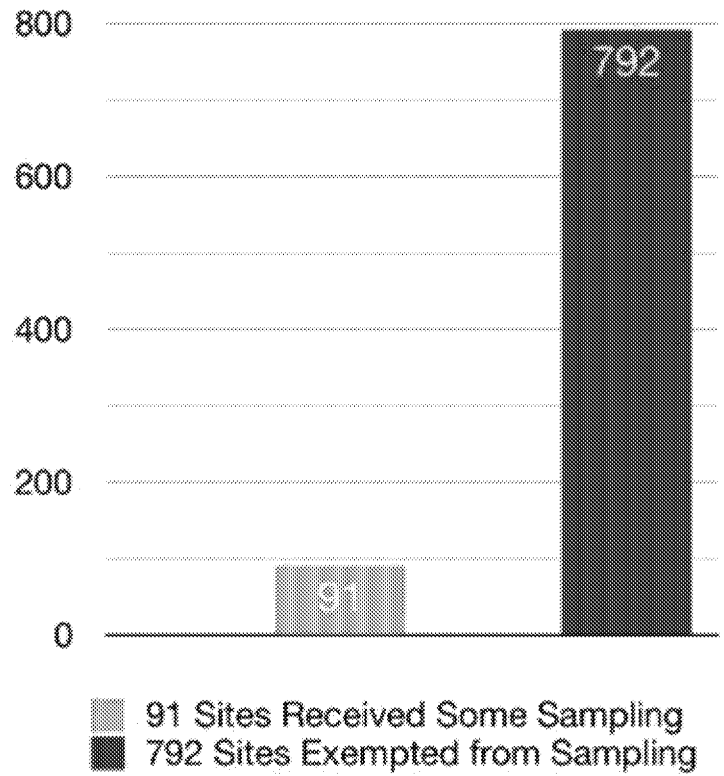
A Navy document (2004 HRA) simply asserted *90% of all HPNS sites* were "non-radiologically impacted" and thus should be exempt from sampling based on the *assumption* that contamination could only occur where there was record of discrete use and spills.

Furthermore, this determination was made through a paper exercise relying on markedly incomplete historical records.

~90% of HPS Sites Were Never Sampled



792 of 883 HPS Sites Were Exempted from Sampling



The Testing That *Did* Occur Was Deeply Flawed

- Excluding almost all Radionuclides of Concern
- Using extremely outdated cleanup goals
- Inflating background measurements

Almost all Radionuclides Were Excluded from Testing

TABLE 4-2
RADIONUCLIDES USED AT HPS

Radionuclide	Half-Life	Radiation
Ac-227 (Actinium)	21.8 Years	Alpha, beta, and gamma
Ag-108 (Silver)	2.4 Seconds	Beta and gamma
Am-241 (Americium)	432.7 Years	Alpha and gamma
Am-243	7,378 Years	Alpha, gamma
As-73 (Arsenic)	80.3 Days	Beta and gamma
As-76	26.3 Hours	Beta and gamma
Au-195 (Gold)	186 Days	Gamma
Au-198	2.7 Days	Beta and gamma
Ba-133 (Barium)	10.5 Years	Beta and gamma
Ba-140	12.8 Days	Beta and gamma
Be-7 (Beryllium)	53.28 Days	Beta and gamma
Bi-207 (Bismuth)	32 Years	Beta and gamma
Bi-210	5.01 Days	Beta and gamma
Br-82 (Bromine)	1.47 Days	Beta and gamma
C-14 (Carbon)	5730 Years	Beta
Ca-45 (Calcium)	162.7 Days	Beta and gamma
Cd-109 (Cadmium)	462 Days	Gamma
Cd-115	2.23 Days	Beta and gamma
Ce-141 (Cerium)	32.5 Days	Beta and gamma
Ce-144	284.6 Days	Beta and gamma
Cf-252 (Californium)	2.65 Years	Alpha, beta, and gamma
Cl-36 (Chlorine)	3.01×10^5 Years	Beta
Cm-242 (Curium)	162.8 Days	Alpha and gamma
Cm-244	18.1 Years	Alpha and gamma
Co-57 (Cobalt)	271 Days	Gamma
Co-58	70.9 Days	Beta and gamma
Co-60*	5.27 Years	Beta and gamma
Cr-51 (Chromium)	27.7 Days	Gamma
Cs-134 (Cesium)	2.07 Years	Beta and gamma
Cs-137*	30.1 Years	Beta and gamma
Eu-152 (Europium)	13.5 Years	Beta and gamma
Eu-154	8.6 Years	Beta and gamma
Eu-155	4.8 Years	Beta and gamma
Eu-156	15.2 Days	Beta and gamma
Fe-55 (Iron)	2.73 Years	Gamma
Fe-59	45.5 Days	Beta and gamma
Gd-152 (Gadolinium)	1.1×10^{14} Years	Alpha
Ge-68 (Germanium)	270.8 Days	Beta and gamma
H-3 (Tritium)	12.3 Years	Beta
Hg-203 (Mercury)	46.6 Days	Beta and gamma
I-125 (Iodine)	59.4 Days	Beta and gamma
I-129	1.57×10^7 Years	Beta and gamma
I-131	8 Days	Beta and gamma
In-115 (Indium)	4.4×10^{14} Years	Beta
Ir-192* (Iridium)	73.8 Days	Beta and gamma
K-40 (Potassium)	1.27×10^9 Years	Beta and gamma
K-42	12.36 Hours	Beta and gamma
Kr-85 (Krypton)	10.76 Years	Beta and gamma
La-140 (Lanthanum)	1.68 Days	Beta and gamma
Lu-177 (Lutetium)	6.71 Days	Beta and gamma
Mn-54 (Manganese)	312.3 Days	Beta and gamma
Mo-99 (Molybdenum)	2.75 Days	Beta and gamma
Na-22 (Sodium)	2.6 Years	Beta and gamma
Na-24	14.96 Hours	Beta and gamma
Nb-94 (Niobium)	2×10^4 Years	Beta and gamma
Nd-147 (Neodymium)	10.98 Days	Beta and gamma
Ni-63 (Nickel)	100 Years	Beta
Np-237 (Neptunium)	2.14×10^6 Years	Alpha and gamma
P-32 (Phosphorus)	14.28 Days	Beta
Pa-234 (Protactinium)	6.7 Hours	Beta and gamma
Pb-210 (Lead)	22.6 Years	Beta and gamma
Pd-109 (Palladium)	13.5 Hours	Beta and gamma
Pm-147 (Promethium)	2.62 Years	Beta and gamma
Po-210 (Polonium)	138.4 Days	Alpha and gamma
Pr-143 (Praseodymium)	13.58 Days	Beta and gamma
Pr-144	17.28 Minutes	Beta and gamma
Pu-237 (Plutonium)	45.2 Days	Alpha and gamma
Pu-238	87.7 Years	Alpha and gamma
Pu-239*	2.41×10^4 Years	Alpha and gamma
Ra-226* (Radium)	1,599 Years	Alpha and gamma
Rn-222 (Radon)	3.82 Days	Alpha and gamma
Rb-86 (Rubidium)	18.65 Days	Beta and gamma
Ru-103 (Ruthenium)	39.27 Days	Beta and gamma
Ru-106	1.02 Years	Beta
S-35 (Sulfur)	87.2 Days	Beta
Sb-125 (Antimony)	2.76 Years	Beta and gamma
Sc-46 (Scandium)	83.8 Days	Beta and gamma
Se-75 (Selenium)	119.8 Days	Gamma
Sm-145 (Samarium)	340 Days	Gamma
Sm-153	1.93 Days	Beta and gamma
Sn-113 (Tin)	115.1 Days	Beta and gamma
Sr-85 (Strontium)	64.84 Days	Gamma
Sr-89	50.52 Days	Beta and gamma
Sr-90*	28.78 Years	Beta
Ta-182 (Tantalum)	114.4 Days	Beta and gamma
Tb-161 (Terbium)	6.91 Days	Beta and gamma
Tc-97 (Technetium)	2.6×10^6 Years	Beta and gamma
Tc-99	2.1×10^5 Years	Beta and gamma
Te-127 (Tellurium)	9.4 Hours	Beta and gamma
Te-133	12.4 Minutes	Beta and gamma
Te-133m	55.4 Minutes	Beta and gamma
Th-228* (Thorium)	1.91 Years	Alpha and gamma
Th-232	1.4×10^{10} Years	Alpha
Ti-44 (Titanium)	67 Years	Gamma
Tl-204 (Thallium)	3.78 Years	Beta
Tm-170 (Thulium)	128.6 Days	Beta and gamma
Tm-171	1.92 Years	Beta and gamma
U-233 (Uranium)	1.59×10^5 Years	Alpha and gamma
U-235	7.04×10^8 Years	Alpha and gamma
U-236	2.34×10^7 Years	Alpha and gamma
U-238	4.478×10^9 Years	Alpha and gamma
W-185 (Tungsten)	74.8 Days	Beta and gamma
Xe-133 (Xenon)	5.24 Days	Beta and gamma
Y-88 (Yttrium)	106.7 Days	Beta and gamma
Y-90	2.67 Days	Beta and gamma
Y-91	58.5 Days	Beta and gamma
Zn-65 (Zinc)	243.8 Days	Beta and gamma
Zr-95 (Zirconium)	64 Days	Beta and gamma

Over 100 radionuclides used

from US Navy, 2004 Historical Radiological Assessment Volume 2, Table 4-2

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TABLE 4-3
RADIONUCLIDES OF CONCERN AT HPS

Radionuclide	Half Life	Radiations
Ac-227 (Actinium)	21.8 Years	Alpha, beta, and gamma
Am-241 (Americium)	432.7 Years	Alpha, beta, and gamma
Am-243	7,370 Years	Alpha and gamma
Ba-133 (Barium)	10.5 Years	Beta and gamma
Bi-207 (Bismuth)	32 Years	Beta and gamma
C-14 (Carbon)	5715 Years	Beta
Cl-36 (Chlorine)	3.01×10^{5} Years	Beta
Cm-244 (Curium)	18.1 Years	Alpha and gamma
Co-60 (Cobalt)	5.27 Years	Beta and gamma
Cs-137 (Cesium)	30.1 Years	Beta and gamma
Eu-152 (Europium)	13.5 Years	Beta and gamma
Eu-154	8.6 Years	Beta and gamma
Gd-152 (Gadolinium)	1.1×10^{14} Years	Alpha
H-3 (Tritium)	12.3 Years	Beta
In-115 (Indium)	4.4×10^{14} Years	Beta
K-40 (Potassium)	1.27×10^{9} Years	Beta and gamma
Nb-94 (Niobium)	2×10^{4} Years	Beta and gamma
Ni-63 (Nickel)	100 Years	Beta
Np-237 (Neptunium)	2.14×10^{6} Years	Alpha and gamma
Pb-210 (Lead)	22.6 Years	Beta and gamma
Pu-238 (Plutonium)	87.7 Years	Alpha and gamma
PU-239	2.41×10^{4} Years	Alpha, beta, and gamma
Ra-226 (Radium)	1,599 Years	Alpha and gamma
Sr-90 (Strontium)	28.78 Years	Beta
Tc-97 (Technetium)	2.6×10^{6} Years	Beta and gamma
Tc-99	2.1×10^{5} Years	Beta and gamma
Th-232 (Thorium)	1.4×10^{10} Years	Alpha
Ti-44 (Titanium)	67 Years	Gamma
Tl-204 (Thallium)	3.78 Years	Beta
U-233 (Uranium)	1.59×10^{5} Years	Alpha and gamma
U-235	7.04×10^{8} Years	Alpha and gamma
U-236	2.34×10^{7} Years	Alpha and gamma
U-238	4.78×10^{9} Years	Alpha and gamma

Source: Historical Radiological Assessment, 2004

Table 3-4. Soil Radionuclides of Concern

Soil Area	Radionuclide of Concern
Former Sanitary Sewer and Storm Drain Lines and Building 351A Crawl Space	^{137}Cs, ^{226}Ra, ^{90}Sr
Former Buildings 317/364/365 Site	^{137}Cs, ^{226}Ra, ^{90}Sr, ^{239}Pu

3

4

Table 3-5. Soil Remediation Goals

Radionuclide	Residential Soil Remediation Goal[a] (pCi/g)
^{137}Cs	0.113
^{239}Pu	2.59[b]
^{226}Ra	1.0
^{90}Sr	0.331

[a]All RGs will be applied as concentrations above background.

[b] ^{239}Pu is an ROC only for the Former Buildings 317/364/365 Site.

4

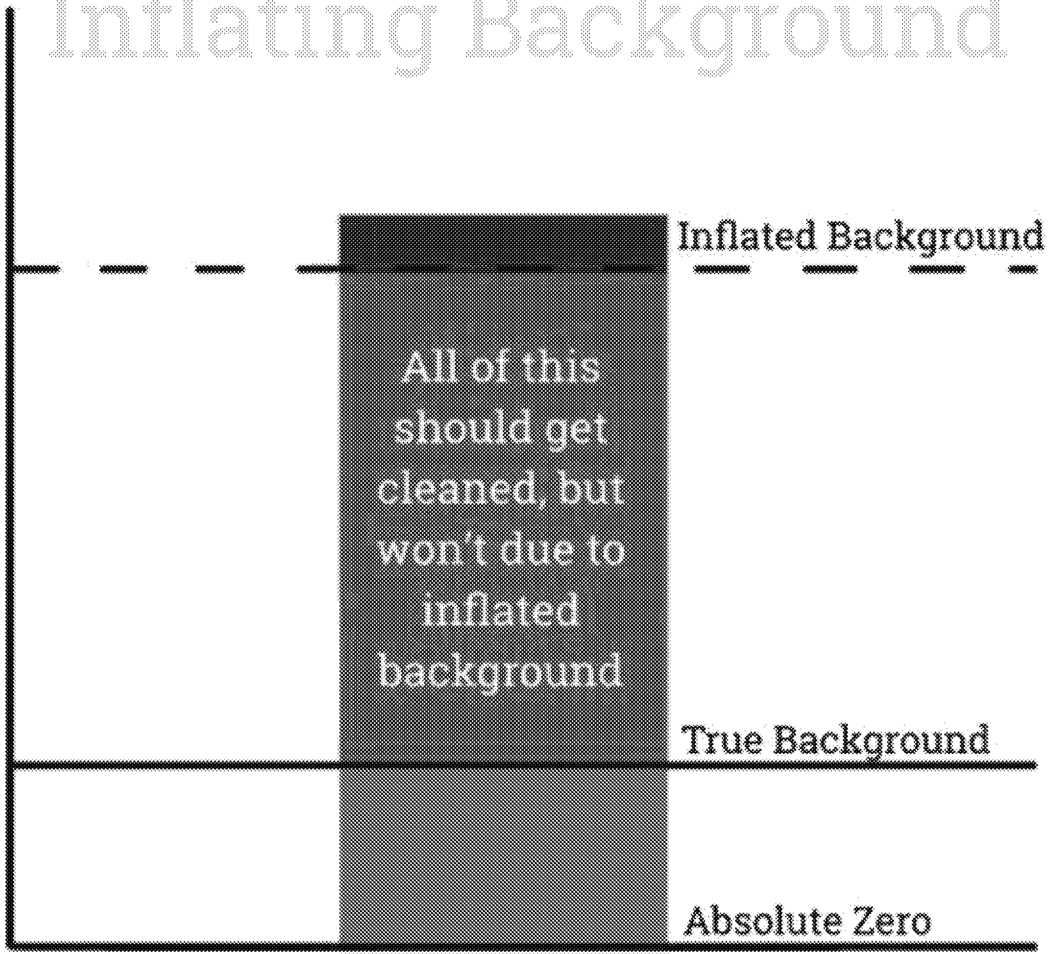
Source: Draft Final Parcel G retesting plan 2018

Testing Couldn't Even Detect those Few Radionuclides Remaining on Their List

- The gamma scans couldn't detect alpha- or beta-emitting radionuclides at all
- They couldn't detect any gamma radionuclide at the cleanup level, with one possible exception
- Soil samples tested for only a small fraction of the radionuclides of concern (~3-4 out of dozens)
- Only a small fraction of soil samples were tested for strontium-90 or plutonium-239; most were only tested for radium and cesium

V. Many of the Problems in the Original Tetra Tech Measurements are Being Repeated in the Retesting

Inflating Background



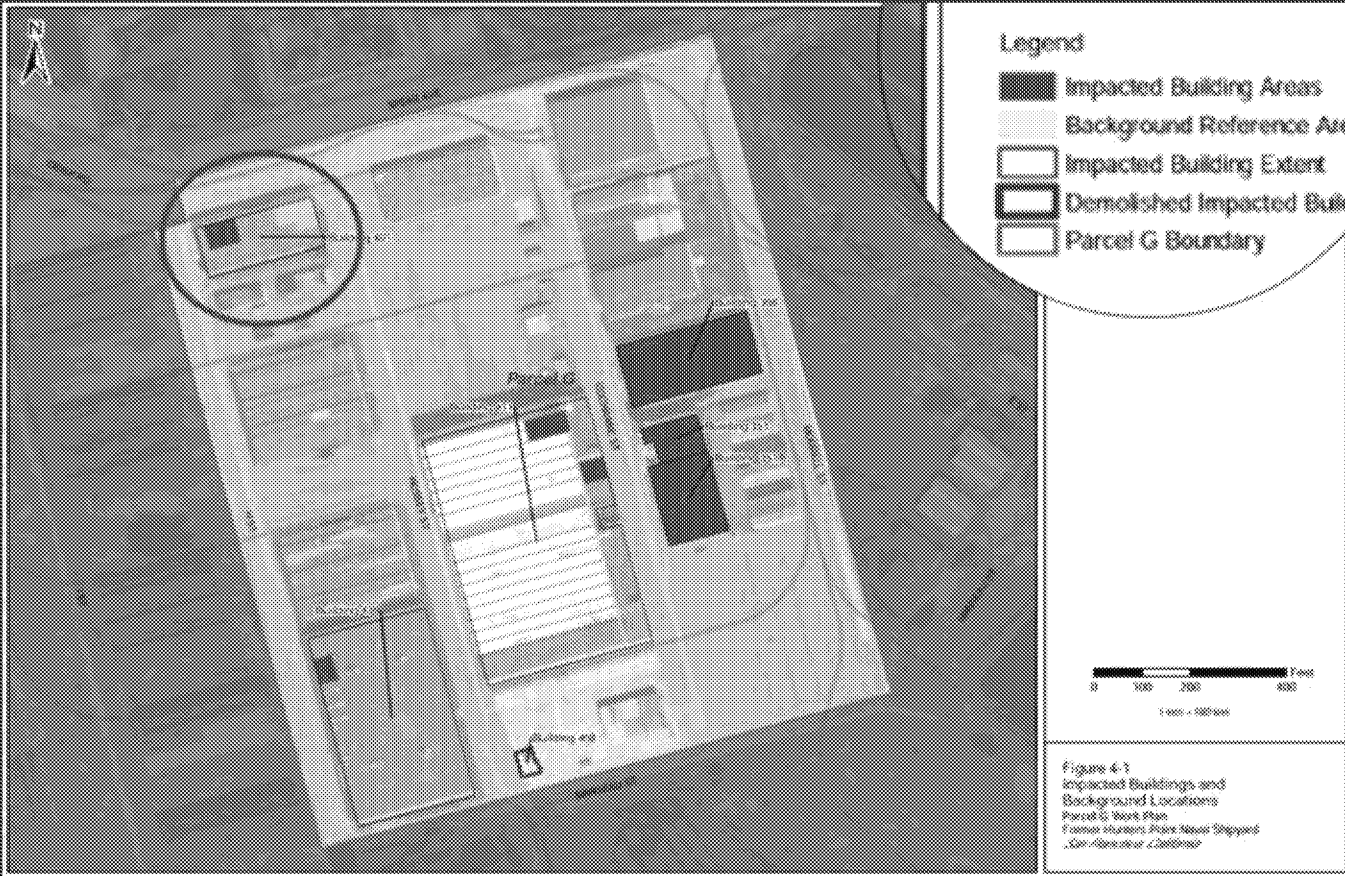
At HPNS, background measurements are taken in potentially contaminated areas

EPA Guidance Forbids Background Locations in Potentially Contaminated Areas

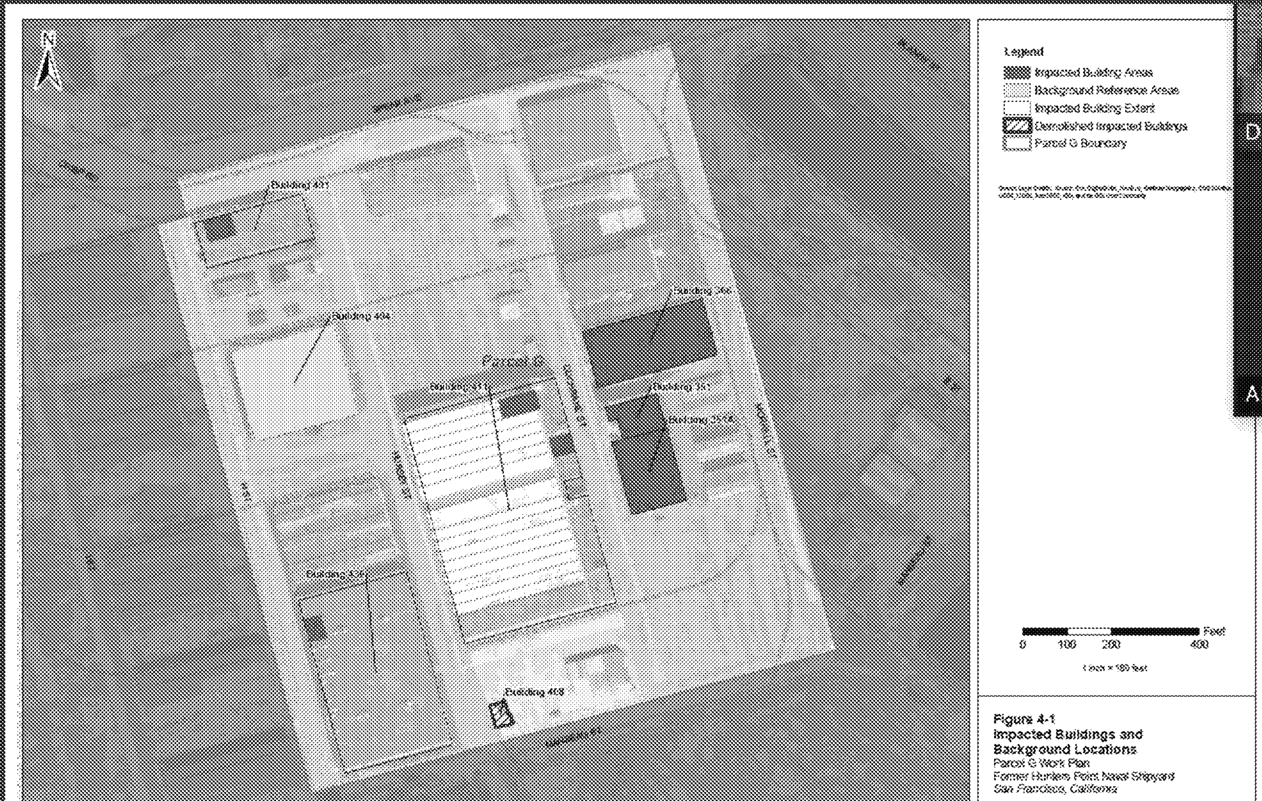
Background Reference Areas should be "selected from non-impacted areas" and "cannot be potentially contaminated by site activities."

Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM), EPA 42-R-97-016

Misuse of Background Continues Beyond TetraTech Scandal

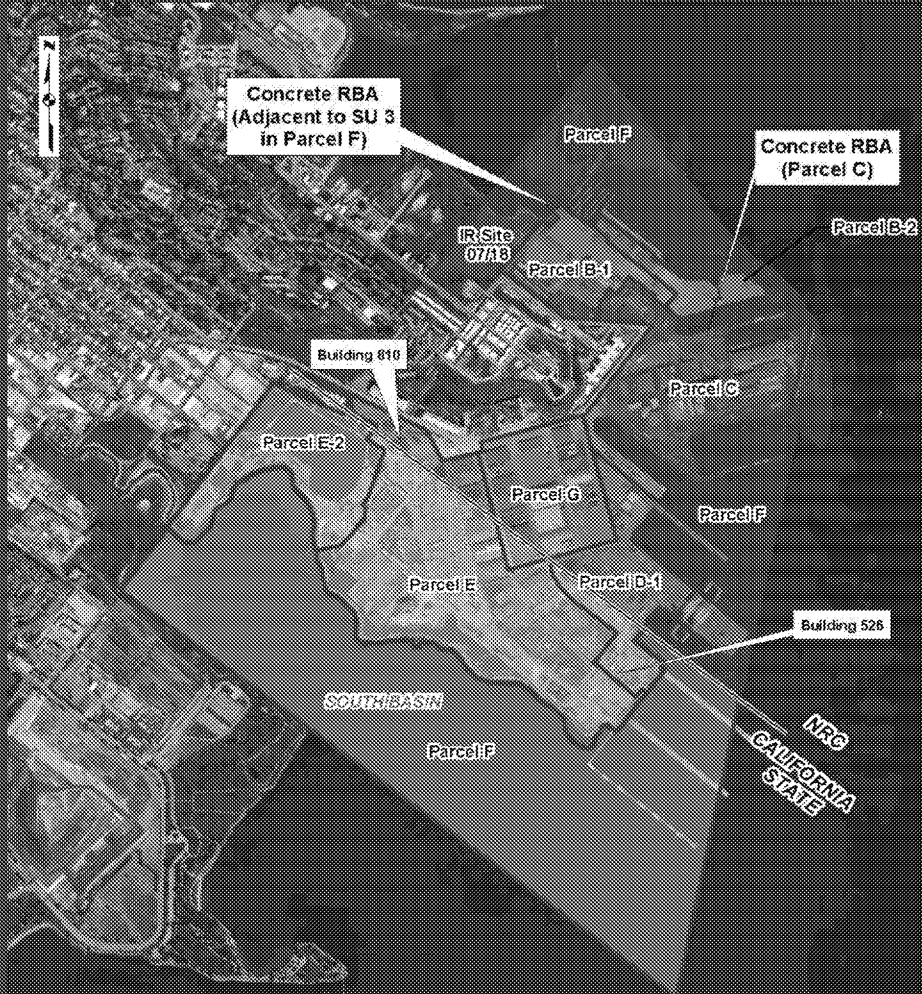


In the Parcel G draft retesting plan, background is taken inside a contaminated building.



In the final retesting plan, they merely moved the “background” location to a building a few feet away, also potentially contaminated.

4 of 5 background reference areas for Parcel G retesting plan are taken from within the Superfund site, and EPA still intends to allow their potential use



The Navy proposed--and EPA did not object to--Reference Background Areas for concrete first near contaminated Bldg 810, then from a concrete pad next to Dry Dock 3, then from a concrete pad next to the Finger Piers. <u>All were in the midst of the contaminated Superfund site and potentially contaminated themselves, in violation of EPA's MARSSIM guidance.</u>

Field Change Request

Appendix B

FIELD CHANGE REQUEST FORM

Contract No.: N62473-17-D-0006	**CTO No.:** N6247317F4550	**Field Change Request Form No.:** 004
Location: Parcel F, Hunters Point Naval Shipyard		**Date:** September 26, 2019
Document Title: Final Revision 2, Radiological Scoping Surveys Work Plan, Parcel F Structures, Hunters Point Naval Shipyard, San Francisco, California, May 2019, DCN: APTM-0006-4550-0025.R2/F		**NIRIS Document #:** N/A

RE: Drawing No.: Not Applicable Title ______

Specification Section Not Applicable Title ______

Other ______

The Final Revision 2 Work Plan states reference data will be collected in similar matrix (i.e., concrete pad) and if needed, additional reference areas may be established with the approval of the Navy. A Navy-approved concrete reference area located on Parcel C was initially used as the concrete reference area; however, data collected to date have shown that this reference area is not appropriate for the Finger Piers.

The background reference area is a geographical area from which representative radioactivity measurements are performed for comparison with measurements performed in an impacted area. According to MARSSIM, a site background area should have similar physical, chemical, geological, radiological, and biological characteristics as the survey unit being evaluated, but has not been identified as impacted. The Conceptual Site Model (CSM) for the Finger Piers is based on potentially radiologically contaminated ships coming into contact with the Finger Piers by berthing along the piers. Widespread radiological contamination is not included in the CSM and is not expected. Finger Pier alpha/beta scan results to date are not consistent with the CSM and indicate the current background reference area is not appropriate. Therefore, the recommended action is to scarify/scabble a selected portion of the Finger Pier for use as the Figure Pier reference background area. Based on the CSM, any potential radiological contamination is on the surface of the piers, and scabbling the top surface will create a non-impacted underlying surface with the same concrete characteristics.

"Conceptual Site Model" Falsely Presumed No Widespread Contamination Possible at HPNS

"Spill model" assumes contamination only present where discrete radioactivity use & spills are known to have happened.

It was a justification for only deeming 10% of sites as potentially impacted and in need of sampling.

As we shall see, this model was proved wrong. But when the data from the Parcel C concrete pad conflicted with the model, rather than revise the model to reflect the data, the data were recommended to be thrown out.

What was the contradiction between the Conceptual Site Model and the Parcel C concrete pad measurements?

The alpha and beta radiation measurements at the proposed "background location" at the concrete pad in Parcel C, where the CSM said there should be *no* extra radioactivity, were

- 8.2 times higher than the measurements made at the presumed contaminated Finger Piers and
- 3.3 times higher than the Submarine Pens.

If the Conceptual Site Model were right, this would be impossible.

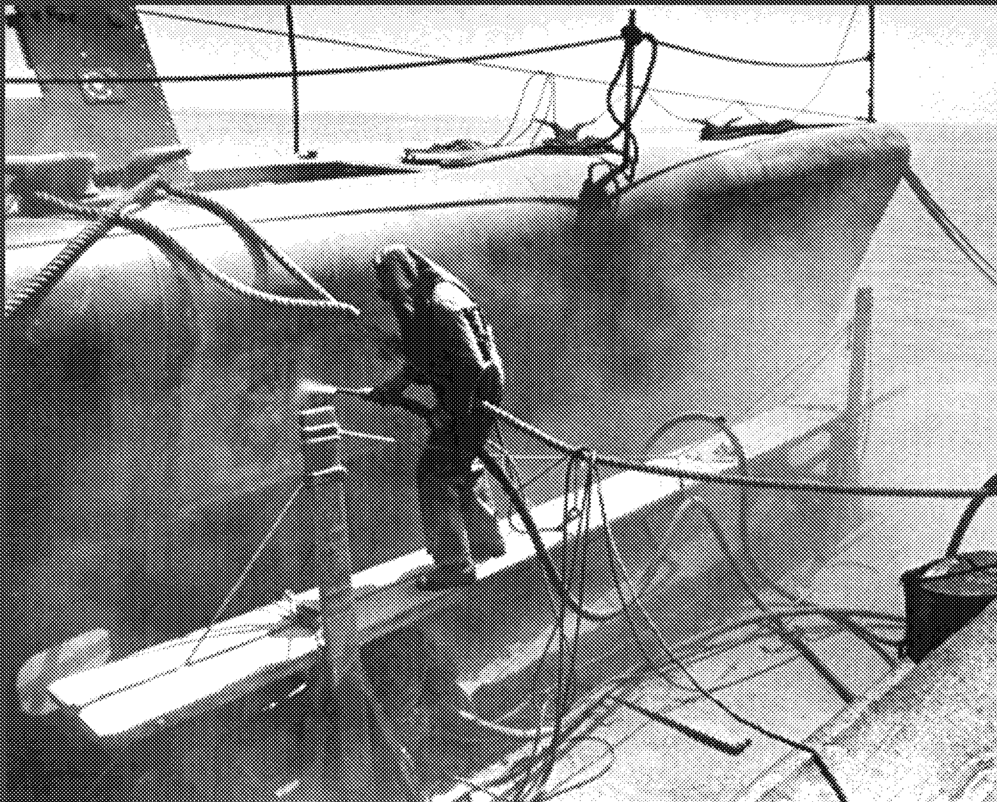
As the Navy quietly admitted, these measurements *called into question the Conceptual Site Model's assumption of no widespread contamination at HPNS*

Despite Finding It Inappropriate, the Navy Nonetheless Used, and EPA Approved, the Concrete Pad in Parcel C for Background for Concrete Alpha & Beta Radiation.

And it then used for Gamma Radiation Background a Concrete Pad Right Next to the Most Contaminated Part of the Submarine Pens, With Even Higher Gamma Readings than the Parcel C Concrete.

The Erroneous Nature of the HPNS Conceptual Site Model's Assumption of No Widespread Contamination is Most Clearly Demonstrate by the Problem of *RADIOACTIVE SANDBLAST GRIT*

VI. Radioactive Sandblast Grit



A thousand tons of sandblast grit were produced from sandblasting each submarine, and far more than that for larger ships.

Several hundred thousand tons of radioactive sandblast grit were thus produced from decontaminating ships from nuclear weapon testing in the Pacific.

After OPERATIONS CROSSROADS, Radioactive Sandblast Grit Was Disposed of at HPNS

"The sandblast grit and decontamination liquids were initially co buried at sea (NAVSEA, 2004)... After December 4, 1946 *the sandblast grit was disposed on site...*"

Navy, "Final Parcel B Technical Memorandum in Support of a Record of Decision Amendment, Radiological Addendum," March 2008, emphasis added

Revelation

The massive amount of sandblast grit used at HPNS on regular ships is also radioactive, not just the grit used for decontamination of ships from the Pacific nuclear tests.

In 2001, an excavation at HPNS found (but did not timely disclose) sandblast grit with 35 times normal background levels of radium. EPA confirmed "The radiation levels are definitely elevated. This is a rad-waste, and it does warrant removal."

EPA, however, claimed the radioactivity didn't come from grit used on contaminated ships but was due to high levels of radium concentrated in the zirconium component of sandblast grit used on regular ships.

Jane Kay, "Cleanup crew didn't report radioactive grit / S.F. group says it will sue contractors at Hunters Point," SFGate, June 2001

"Black Beauty" Sandblast Grit Was Reportedly Used at HPNS

Commonly used at naval shipyards, it is a coal-slag abrasive, which contains uranium, thorium, radium, and daughter products.

The process of making it into sandblast grit concentrates the radioactivity.

City of San Francisco Report Discloses That Both the Grit from Sandblasting Nuclear Test Ships *and* Regular Ships Was Radioactive

OCII 2015 report confirms that sandblast grit (also known as Abrasive Blast Material, or ABM) contains radioactive materials such as radium that are "concentrated during the ABM manufacturing process," so *both* the grit from decontaminating ships from the nuclear tests and grit from sandblasting regular ships contained "elevated radiation levels."

San Francisco Office of Community Investment and Infrastructure, "Executive Summary, Status of the Environmental Remediation of the Hunters Point Shipyard," March 2015, p. 77

In Addition to Decontaminating Ships from the Pacific Nuclear Tests, Hunters Point Was Used for Decades for Putting Ships into Dry Docks to Sandblast the Rust & Old Paint Off the Ships to Prepare Them for Repair and Repainting

Very large amounts of used sandblast grit (many hundreds of thousands of tons) were thus produced.

Where Did the Radioactive Sandblast Grit Go?

"Historically, after a sandblasting operation, there was a large quantity of used ABM. This used material was sometimes stockpiled and then reused. Anecdotal evidence suggests that ABM was sometimes used at the Shipyard as bedding, aggregate, or backfill material (e.g., for pipelines, former fill areas, roadways, and driveways)."

OCII, "Executive Summary, Status of the Environmental Remediation of the Hunters Point Shipyard," p. 77

Extraordinary: The Navy Doesn't Know How Much Radioactive Sandblast Grit is at Hunters Point--Or Where

"Typically, the Navy did not keep records documenting the placement locations, so the exact locations and quantities of ABM are not known. However, ABM has been encountered during site characterization and remediation activities."

OCII, "Executive Summary, Status of the Environmental Remediation of the Hunters Point Shipyard," p. 77

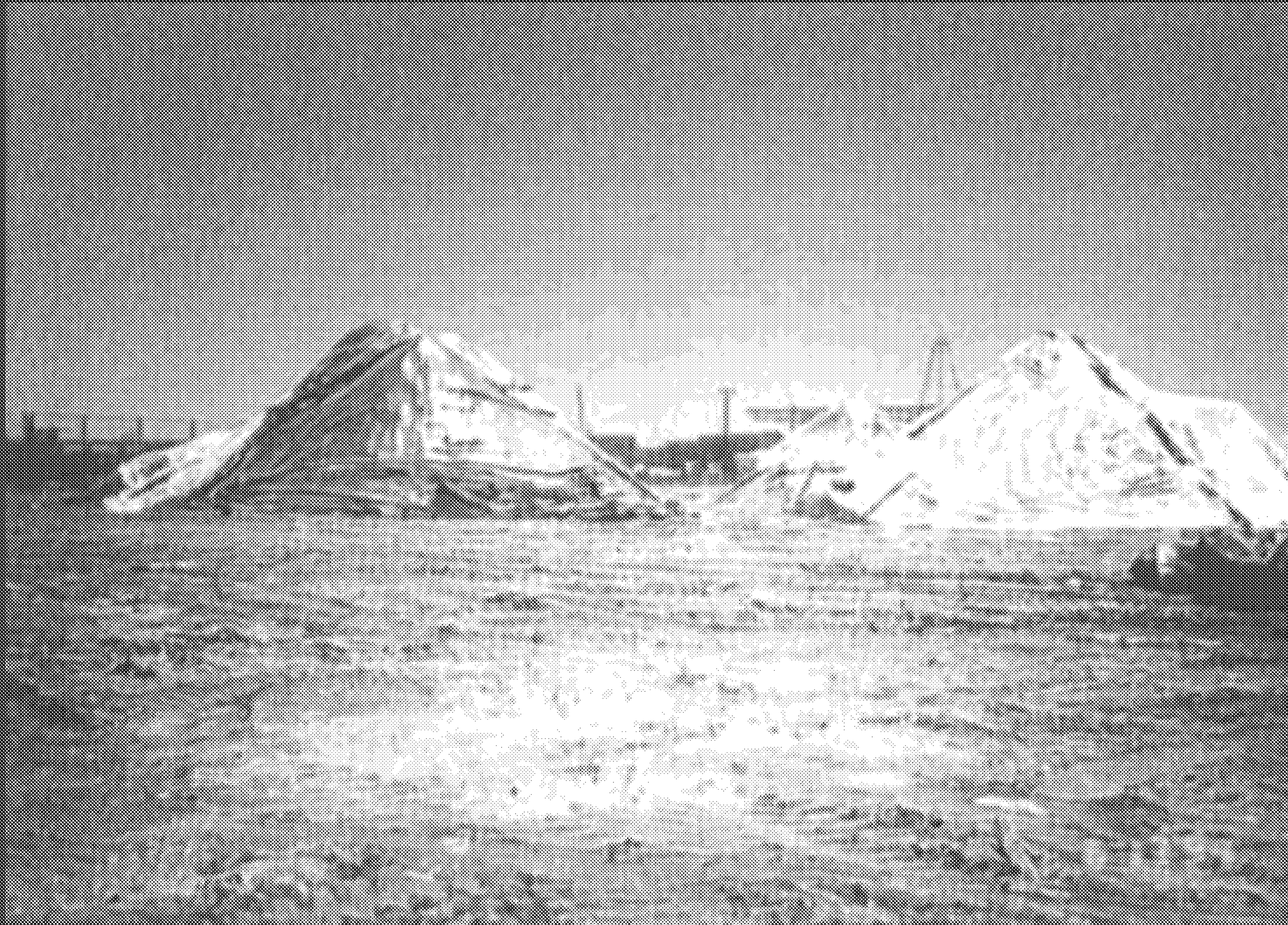
THE REGULATORS KNEW ALL ALONG BUT DID NOTHING

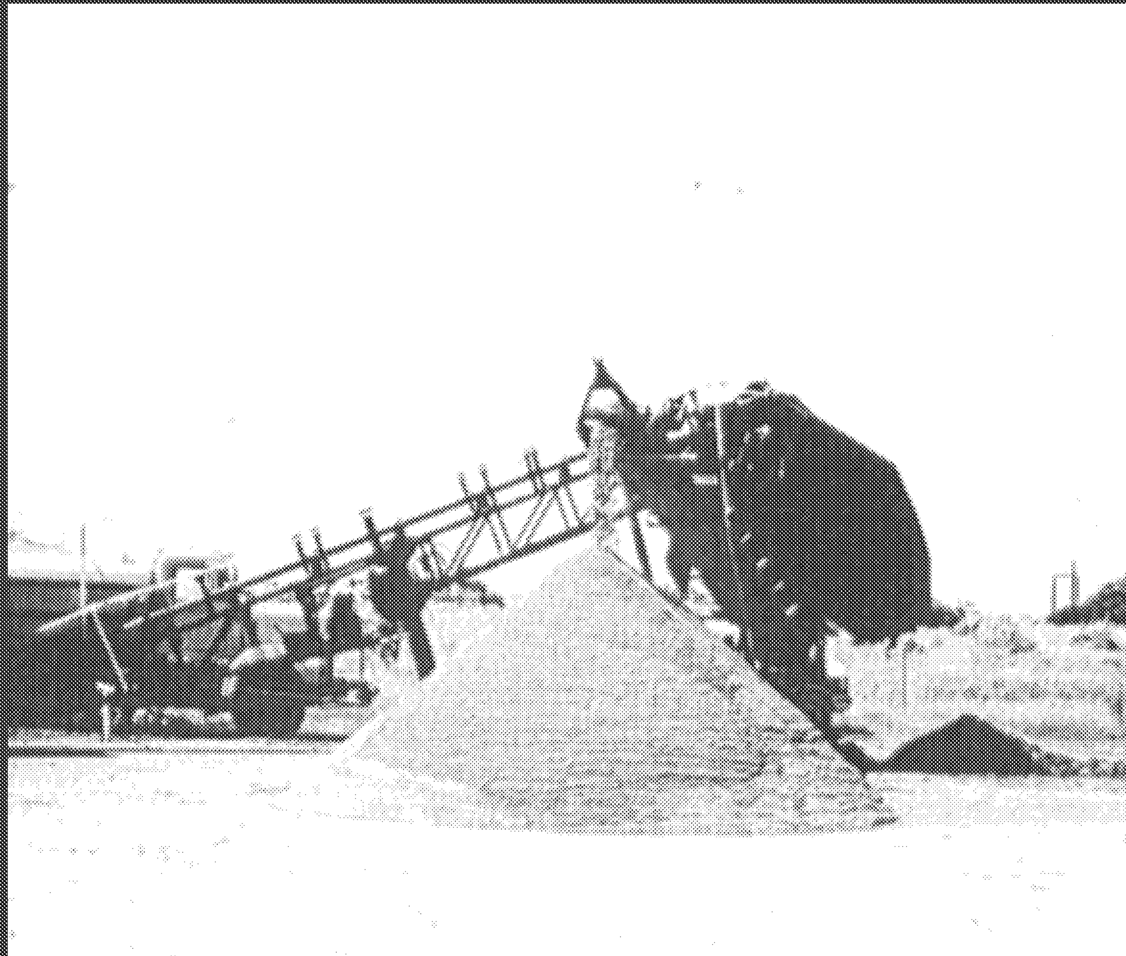
"Despite these discoveries...the regulatory agencies have required no further investigation of this issue."

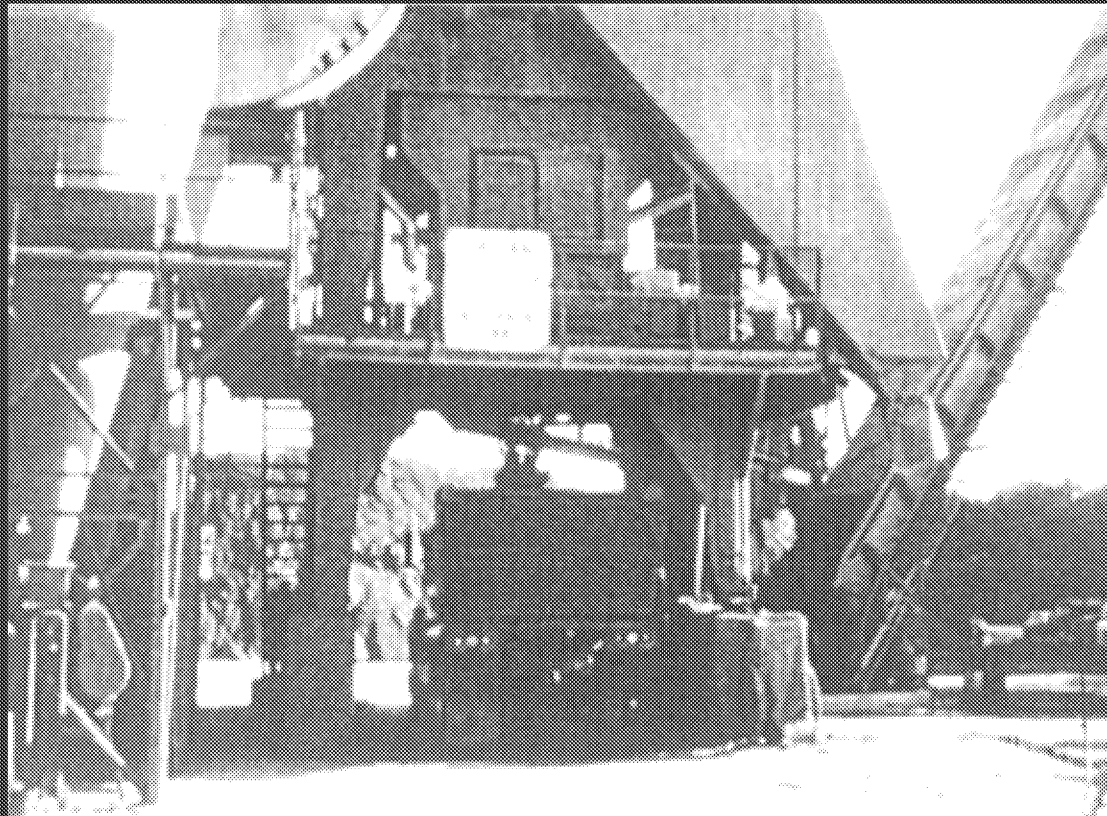
OCII, "Executive Summary, Status of the Environmental Remediation of the Hunters Point Shipyard," March 2015, pp. 77, 78

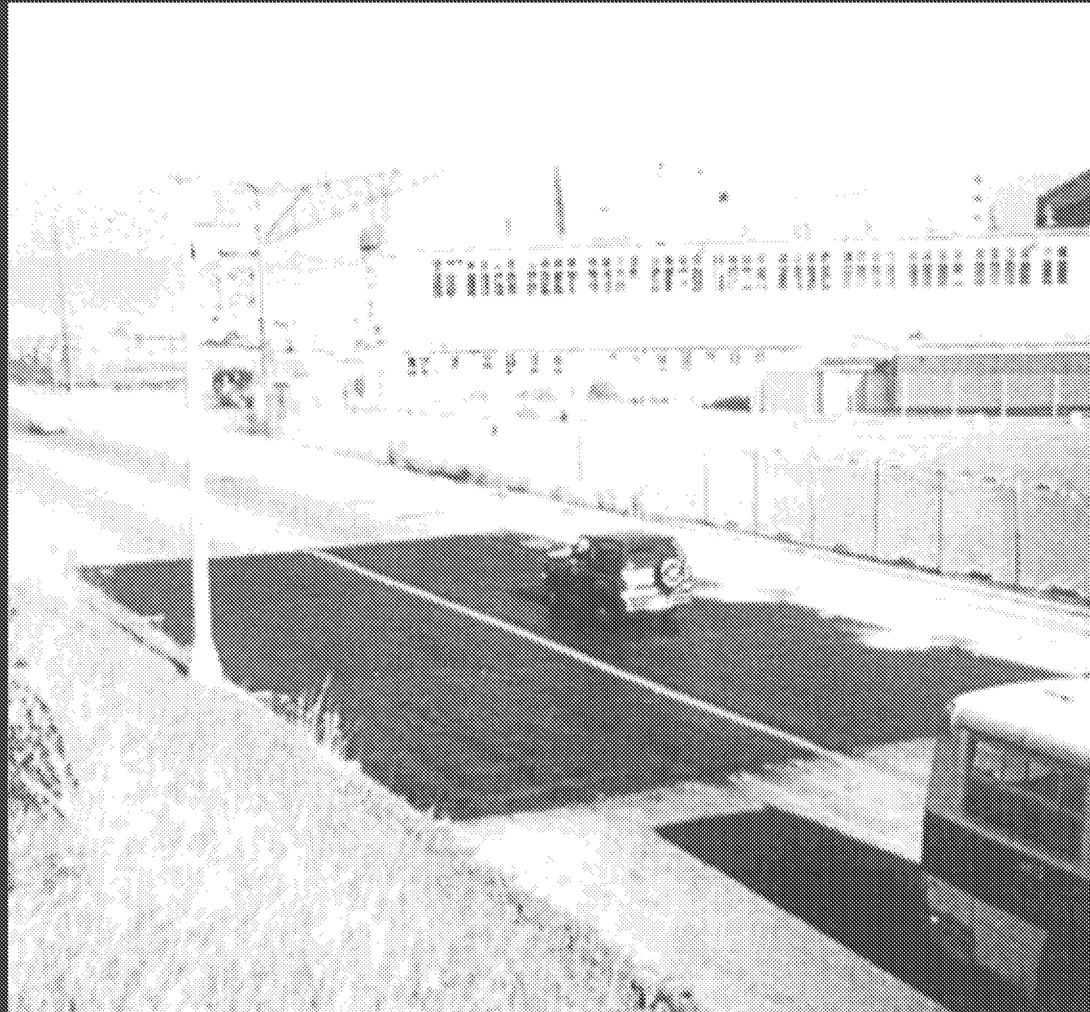
What Happened to the Sandblast Grit?

Some was “recycled” into asphalt and used to pave roads at Hunters Point and in the Central Valley.









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HPNS: Made in Part Out of Radioactive Waste

"More than 80 percent of HPS consists of relatively level lowlands that were mostly constructed by placing borrowed fill material from a variety of sources, **including serpentinite bedrock from the shipyard, construction debris**, and waste materials (<u>such as used sandblast materials</u>)"

United States Department of the Navy, Base Realignment and Closure Program Management Office West, "Final Amended Parcel B Record of Decision, Hunters Point Shipyard, San Francisco, CA," January 2009, p. 61, emphasis added

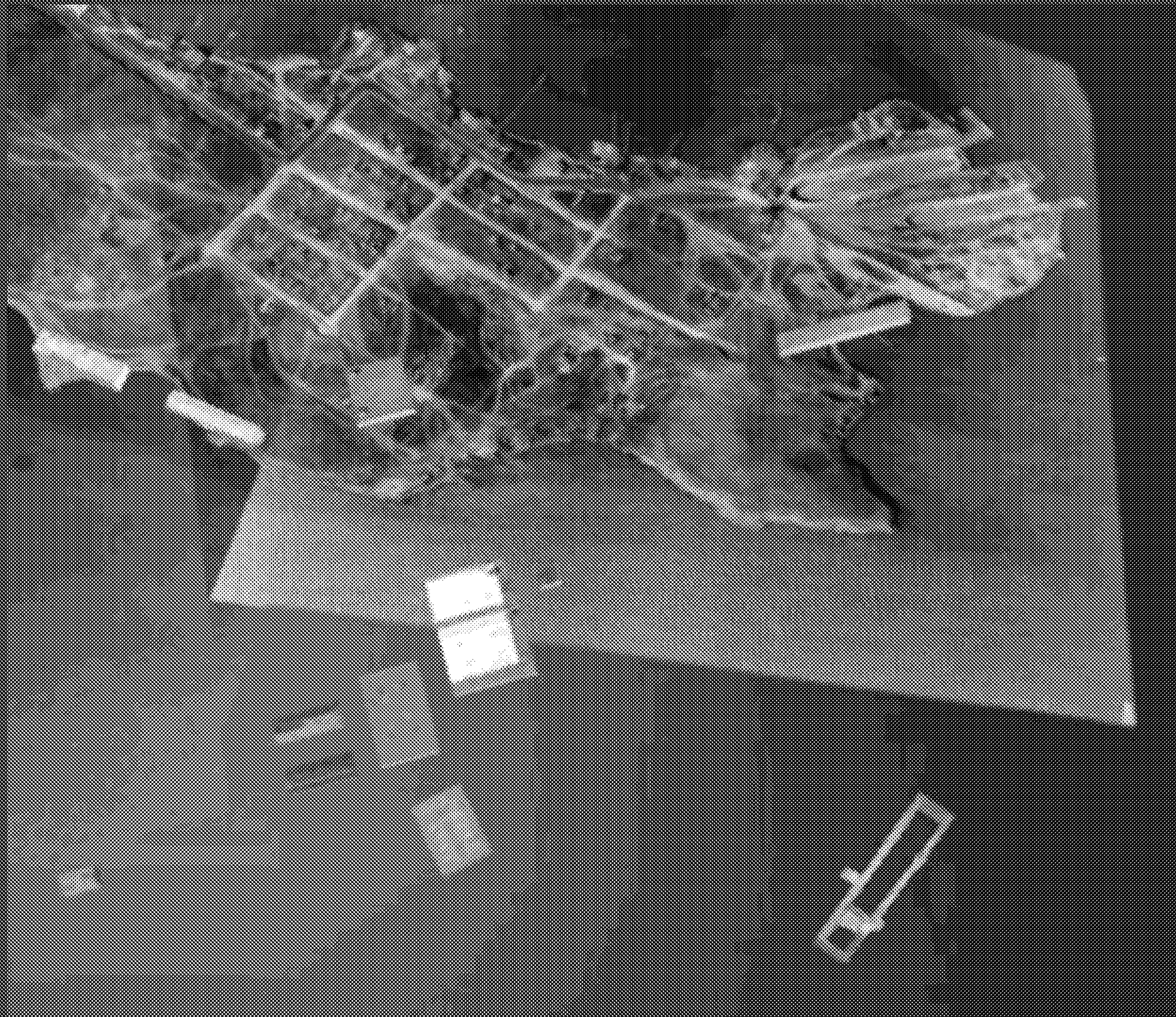
Fill Composed of Sandblast Waste

"The second type [of fill] consists of material generated by industrial activities (mainly sandblast waste) and includes landfills composed of industrial and some domestic waste. In the early to mid-1940s, the Navy began placing these fills along the bay margin, primarily as a means of disposing these industrial materials."

(Harding Lawson Associates, "Work Plan Volume 2A, Sampling Plans for Group I Sites, Remedial Investigation/Feasibility Study," December 1988, p. 15)

Aerial view of HPNS, 1938 with contemporary streets overlaid. (Google Earth)

HPNS, aerial view 2021. (Google Earth)



Aerial view of HPNS from 1938 with contemporary buildings overlaid. (Google Earth)

HPNS, aerial view 2021. (Google Earth)

ASK #1: Fix the Soil Cleanup Standards

Direct that the soil cleanup standards for Hunters Point be corrected so they are set at 10^{-6} for unrestricted residential use, based on the EPA PRG calculator using the EPA defaults and consistent with Prop P.

Commence a scientifically rigorous process to include the garden pathway in EPA's national Regional Screening Levels for toxic chemicals, parallel to how it has been done in its radionuclide PRGs.

ASK #2: Repair the Building Cleanup Standards

Assure EPA does not capitulate to the Navy regarding the cleanup standards for buildings. The Navy must be required to clean up contaminated buildings to the levels set in the BPRG calculator for 10^{-6} risk. EPA should insist on CERCLA 120(a)(2) being complied with and EPA CERCLA Guidance fully followed.

ASK #3: Fundamentally Overhaul the Testing & Retesting for Contamination

Measure for all radionuclides of concern, with detection limits capable of measuring concentrations at the PRG & BPRG 10^{-6} limits, using background locations offsite that cannot have been impacted by HPNS activities, and with sampling -- not scanning -- of the whole site, and at multiple depths.

Ask 4: Initiate a Comprehensive Site-Wide Testing of the Entire Site for Radioactive Sandblast Grit & Prepare Comprehensive Remediation Plans for All That is Found

This must be based on actual sampling, at various depths, and laboratory measurements for radium, thorium, uranium, and the full range of other radionuclides of concern.

[It cannot be merely a quick-and-dirty gamma scan of the surface that could only detect a highly radioactive discrete source like a deck marker, such as the Navy is doing.]

Ask #5: Establish a Mechanism for Genuine & Meaningful Community Oversight of the Cleanup and to Assure Accountability of the Agencies

Cleanup and testing/retesting need to be overseen by a community/independent expert panel. Use as a model the Santa Susana Field Laboratory community-overseen EPA radiation survey and the community/independent expert panel that oversaw epidemiological studies. Rely on existing on-the-ground EJ community groups such as the SouthEast Community Council.

ASK #6: Top-to-Bottom Review of Oversight Failures

Undertake a top-to-bottom review of EPA oversight failures that contributed to the unprecedented environmental scandal at HPNS and the breakdown of the HPNS cleanup more broadly.

Thank you.